

BIGGLE Orchard Book



BIGGLE
FARM

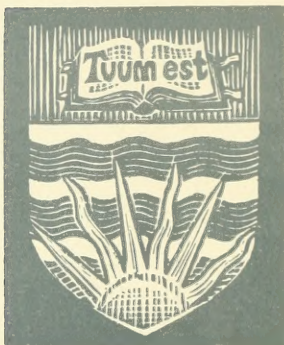
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Harriet says that a book, like an orchard, needs a promising outlook. How will this do?

BIGGLE ORCHARD BOOK



Fruit and Orchard Gleanings From Bough to Basket

GATHERED AND PACKED INTO BOOK FORM

BY

AV: JACOB BIGGLE

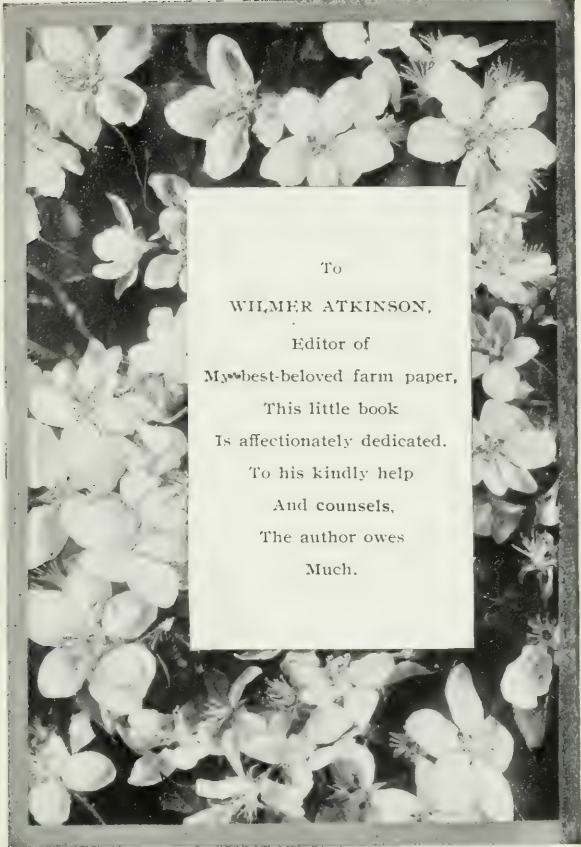
ILLUSTRATED

*"Plant fruit trees. Who plants and tends a tree hath
part in God's own work, and makes the
earth more beautiful."*

PHILADELPHIA
WILMER ATKINSON CO.
1911

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THIRD EDITION
THIRTIETH THOUSAND



To
WILMER ATKINSON,
Editor of
My best-beloved farm paper,
This little book
Is affectionately dedicated.
To his kindly help
And counsels,
The author owes
Much.

ILLUSTRATIONS IN COLOR.

(SPECIAL NOTE: All colored pictures are two-thirds natural size.)

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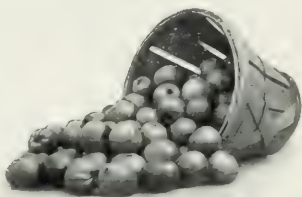
PREFACE.

The writing of this little book has surely been a labor of love. Harriet and I love trees. They are our pets, and we think as much of them as we do of the animals and birds on the farm.

It had sometimes occurred to me that a need existed in this country for a simple, practical, inexpensive, boiled-down yet complete, printed talk on the subject of tree fruits,—a talk that would help the amateur as well as the more experienced orchardist. My publishers encouraged the idea, saying that requests for such a treatise had often been received at their office during the past few years. Well—to make a long story short—this book is largely the result of their encouragement and kindness; without such helps I very much doubt whether the idea ever would have materialized into clear type.

Harriet has helped me, too—bless her heart. So have Tim and Farmer Vincent. And so have the artists, designers, engravers and photographers who are connected with the Wilmer Atkinson Co.

Yes, and my thanks go out, also, to the various practical fruit men, government experts, and writers, whose helpful suggestions, letters, pictures and

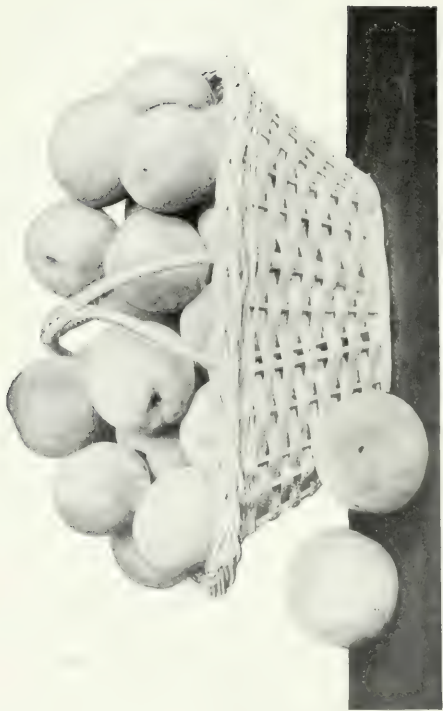


bulletins have been of aid to me in the preparation of this volume. At times, too, I have been glad to consult Prof. Bailey's Cyclopedia of American Horticulture, Thomas' American Fruit Culturist, Barry's Fruit Garden, and other standard reference books. And I am indebted to H. W. Collingwood, Editor of the Rural New-Yorker, for permission to reproduce the excellent dwarf pear photo-engraving in Chapter XV; and to K. E. Harriman, of the Pilgrim Magazine, Battle Creek, Mich., for his courtesy in allowing me to use the peach-grader picture in Chapter XIX. Occasionally I have used extracts from letters and from Experiment Station or Department of Agriculture literature, but, in the main, this Orchard Book embodies my own experiences, observations and conclusions—the result of a lifetime of practise and study.

My friend, Wilmer Atkinson, claims that his paper is "Unlike any other." He's right, too. It is. And, following a good example, I have tried to make this book different from any other. It isn't an encyclopedia; it isn't a long-winded two or three dollar text-book; it isn't an incomplete pamphlet; it isn't hard to understand; and it isn't a rehash of other people's guesswork. No. It's simply a plain little book that aims to tell the inquiring reader *just what he or she needs to know*—no more, no less. I have tried to have all the necessary facts set down and all the unnecessary things left out. It's boiled-down "essence of orchard," served with picture trimmings, and side dishes of the finest colored plates ever put into a horticultural book. I hope you will like it, and that your orchard may prosper accordingly.

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A BASKET OF CRAWFORDS

CHAPTER I.

STARTING AN ORCHARD: PLANNING.

If a man doesn't start, he will never get anywhere.—Tim.

The first thing to do about starting an orchard is to plan for it. Put on your thinking-cap, study into the matter, and do not jump in the dark. A slow start is much better than a poor start. Harriet says that an orchard set in the right place, at the right time and of the right varieties, is worth just "eleven times" more than a hit-or-miss orchard. (Where she secured the data for such exact figures, I do not know; but I am willing to admit that she is about right in this statement.)



PLANNING THE ORCHARD

To begin, suppose we consider the question of "right place." The ideal spot for a proposed orchard is gently sloping and high. This doesn't mean that it must be on top of a mountain. No. It means only *comparative* height. The spot should be somewhat higher than its surroundings. That is the idea. Then when a frost comes—or a deluge—it quickly runs off on to the lower lands. Proper frost drainage is just as important as good water drainage. More so. Why? Because water can be tiled away; frost can not. Some growers prefer a north or some other slope; but

height of land is of more importance than direction of slope.

Another thing to consider carefully, is the local climate and conditions connected therewith. For instance: Before setting a commercial orchard of, say, peach trees, look around and ascertain whether the natural local conditions are favorable to that particular fruit. Is the locality a "peach section"? Are



ISN'T SOMETHING LIKE THIS WORTH
PLANNING FOR?

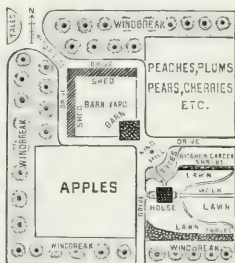
there successful peach orchards already established? Is the average winter climate mild enough for this somewhat tender fruit? Does the state experiment station advise the planting of peaches in your locality? Do near-by practical fruit-growers advise it? If the answer to each of these questions is, "No," the chances are that you will be wise to change your plans and plant some other species of fruit,—some kind which *is* exactly adapted to the locality. The same rule holds good (to a greater or lesser degree) with other fruits.

Other local conditions to consider, before setting a commercial orchard, are transportation, marketing facilities, and the help problem. In some localities it is possible to employ transient help just when most needed,—men for picking (for example), or women for packing; in other localities it is almost impossible to secure such temporary assistance.

Carefully study the question of soil in its relation to the fruits, etc., to be grown. Some kinds of fruit do best on light soils, some do best on heavy soils. The difference between a sandy or a clayey location may mean the difference between success and failure. In this book will be found, in the special chapter devoted to each kind of fruit, etc., hints about the soil best suited to the species.

The foregoing suggestions apply with most force, of course, to large orchards planted for market purposes. The home orchard for family use necessarily means an aggregation of various kinds of trees probably all set together on one kind of soil, and therefore it is not in this case always possible to cater to all the requirements of each. But it pays to do so, as nearly as is practicable, even with a small family orchard.

Examine the subsoil. Is it so hard and so near the surface that tree roots can never hope to find a secure anchorage? Does water stand above the



SUGGESTION FOR HOME-ORCHARD ARRANGEMENT

subsoil in such quantity and with such persistency as to threaten "wet feet" to the trees? If the former, seek another location; if the latter, make up your mind to tile the field before setting the trees. There are few orchards which are not the better for a system of underground drains. Better do the necessary tiling at the start, rather than later. Have the tile buried three feet deep, and, if possible, lay it midway between tree rows.

Now let us consider the question of the "right time." Generally speaking, early spring is the best season to set an orchard. There are some exceptions to this, of course. For instance: Sweet cherry trees often grow better when set in the fall. Some of the more hardy fruits—apples, pears, etc.,—may be planted in autumn, if desired. Latitude has much to do with this question. The farther south you are, the safer it is to practise fall planting.

In the north, however, it is seldom wise to set tender trees, like peaches or plums, until spring; therefore the best rule I can give to the planter who isn't an expert, is: Stick to spring planting. Tim says that it's "better to be safe than sorry," and I am sure he is not far wrong.

But it is usually good policy to purchase trees in the fall, "heel" them in near the proposed orchard, and thus be ready for instant action when the ground gets into workable shape in the spring. The fall buyer gets first choice of trees, and runs no danger of delayed spring shipments. Or, buy the trees in the fall, and let the nurseryman keep them for you until winter is over.

How to "heel in" trees: Dig a trench, about a foot and a half deep, the same in width, and as long as may be necessary; if possible, choose a high, sheltered, well-drained spot. Untie the bundles of trees, and place them loosely along the trench, —each variety by itself, properly labeled. Half-a-dozen trees to a running foot is close enough. Of course put the roots in the trench; then incline the trees backward until they are "half lying down" across the excavation. Now shovel in fine dirt, carefully firm it into place, and pile the remainder of the excavated dirt well up around the roots and lower portion of trunks. If the climate is very cold, or if rabbits and mice are feared, earth can be piled still higher up around the trunks and perhaps even around the lower branches. If large quantities of trees are to be



"HEELING IN" TREES:
TRENCH READY;
UNTYING NURSERY BUNDLE



"HEELING IN" OPERATION
COMPLETED, EXCEPT SHOVELING
SOIL IN PLACE

"heeled in," work is lessened and matters simplified if close-together parallel trenches are used instead of a single long one, using the dirt from each new trench to cover the preceding one. Drain the water away from the trenches.

I earnestly advise all intending tree planters to visit the nearest reliable nursery and personally select the trees wanted. Pick out straight, healthy, properly-branched, thrifty trees. Medium-size trees are usually best. Of course they should be fumigated and guaranteed free from scale, crown gall, etc. (The tops should be dipped at home in the lime-sulphur mixture, to make scale assurance doubly sure.)

But perhaps you may prefer to grow your own trees, instead of buying them already grown. If so, you will find directions for seed sowing, budding and grafting, in the next chapter.

At last we have come to the matter of "right varieties." And this is a very important matter, indeed. So important, in fact, that if it requires a year of preliminary study and inquiry to decide the matter rightly, it will be time profitably spent.

Study the various fruit chapters in this book, wherein I have endeavored to give desirable lists of varieties for different localities. Write to your state experiment station, mentioning the nature of your soil, and ask for special advice as to the best varieties for *you* to plant; and be sure to state whether your orchard is wanted for market or family purposes. Talk with practical fruit-growers in your locality. Consult with your market buyers (if you are to have a commercial orchard), or with your family's taste (if it's to be a home orchard).

Also, before buying or planning an orchard or ordering trees, study these facts about pollination of blossoms: Much of the unsatisfactory fruiting of orchards all over the country is due to self-sterility. A tree is self-sterile if it can not set fruit unless planted near other varieties. The main cause of

self-sterility is the inability of the pollen of a variety to fertilize the pistils of that variety. An indication of self-sterility is the continued dropping of young fruit from isolated trees or solid blocks of one variety; also, fruit from a self-sterile tree is apt to be imperfectly formed. Self-sterility is not a constant character with any variety. Poorly-nourished trees are more likely to be sterile with their own pollen than well-fed trees are. The loss of fruit from self-sterility may be prevented by planting other varieties among the self-sterile trees, or by grafting other varieties into occasional trees. For names of varieties which are often self-sterile, consult each special fruit chapter in this book.



Getting the ground ready for the tree-setting is another important part of "starting an orchard." If possible, plow it in the fall. At least, it should be plowed previous to planting. Harrow it until the field is fine and level.

If the ground was in sod last year, better grow potatoes and subdue the grass previous to setting trees. Preliminary fertilizing may or may not be necessary or desirable. If the land is fairly fertile, I should prefer, ordinarily, to apply manure or fertilizer after the trees are planted, rather than before—'tis more economical. (See Chapter VI for further fertilizing facts.)

It is a good idea to make a plan of the orchard, drawn to scale, and mark thereon just where each tree is to go. This is a great help when figuring out how many trees to buy, or when setting the trees, or in after years when somebody asks: "What's the name of *this* tree?"

DON'TS.

Don't plan to start an orchard on sod.

Don't waste money in buying "big" trees.

Don't allow that you know it all: consult with the other fellow.

Don't locate an orchard on or very near the steep bank of an abrupt, deep ravine. A big gully often acts like a frost trap.

Don't plan to set large, solid blocks of trees of any one variety. Better alternate several varieties in double rows.

Don't forget that tree roots are not improved by exposure to wind or sun. Don't let them dry out, unduly, before "heeling in" or planting. Protect a newly-dug tree as you would a baby.

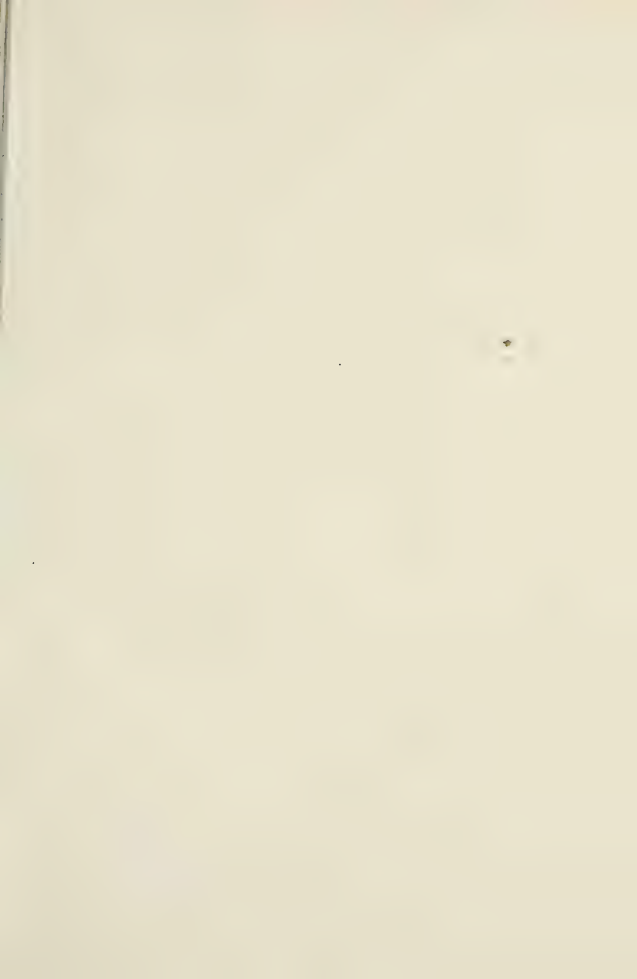
Don't neglect to plan for the planting of a windbreak on the north and west sides of the orchard,—but not too close; about forty feet distant will do. Scotch pine or Norway spruce makes a good shelter.

The orchardist who figures the "possible net profit from one tree," and then multiplies that sum by the number of trees in the orchard, is usually storing up disappointment. Orchards, like chickens, seldom hatch out a crop exactly "according to rule."

Don't figure on "novelties," nor varieties that the market doesn't want; nor varieties that are already overplanted. Plant few kinds for market, rather than many kinds. Remember that large, uniform lots can be sold to better advantage than an assortment of many varieties. "Carload lots" always command attention.

Don't forget that the near presence of large bodies of water (preferably to the windward of the orchard), is often an important factor in the production of tender varieties of fruit. For example: Peaches, etc., are successfully grown on the east bank of Lake Michigan, and not on the west bank; and, on the east bank, the crop is more sure within three miles of the lake than it is farther inland.

The age at which different fruit trees begin to bear moderately profitable crops varies greatly according to soil, climate, culture and variety, but perhaps a fair average would be: Apples, in ten or twelve years from setting (Spy, Spitzenburg, Rambo, Seek-no-further, etc., are very slow); cherries, five or six years; oranges and lemons, eight or ten years; peaches, four or five years; pears (standard), ten or twelve years; pears (dwarf), four or five years; plums, five or six years; quinces, five or six years. (Note: On irrigated western lands, apples, etc., often bear paying crops sooner than the above; but the trees are usually shorter lived.)





CHAPTER II.

SEED-GROWING, GRAFTING AND BUDDING.

Forward in the name of God : Plant, graft and nourish up trees in your ground ; the labor is small, the cost is nothing, the commodity is great ; yourselves shall have plenty, the poor shall have somewhat in time of want, and God shall reward your good merits and diligence.—From an old English orchard book.

Nearly all orchard trees come from seeds originally planted in nursery-beds, and later, after being budded or grafted, transplanted to the orchard. They are in fact usually transplanted once or more before being finally put out in the orchard,—except in the case of the chestnut, hickory, etc., which object to being transplanted and are more easily grown by planting the nuts where the trees permanently belong.

To those accustomed to sowing flower and vegetable seeds it is often a surprise to find that tree seeds do not germinate so readily as the others. It is a fact that they do not. Still, fair success may be looked for by attention to the preservation and sowing of the seeds.

Joseph Meehan says:—"As a rule, all kinds of seeds of trees are the better sown in autumn. As soon as the seeds are ripe, keep them in a cool place and in sand so that they will not lose weight by drying. If in a building not exposed to winds, it will be a suitable place. Apple, cherry, peach and the whole list of such trees are included. Nurserymen who raise trees by the millions follow this plan.

“ The seeds are sown in beds, usually four feet in width, the seeds well covered, as any other seeds would be. A covering of forest leaves, straw or like material is placed over the beds, kept in place by adding branches of trees, sticks or prepared slats. This covering is taken off gradually in spring, as the seeds germinate.

“ Should it be inconvenient to sow in autumn, the same result may be expected from spring sowing, but the seeds must be properly preserved. There must be no loss of weight through the winter; the seeds must be as fresh in spring as when gathered. To accomplish this, either keep them in a damp cellar or mix them with slightly damp soil and keep in a cool cellar or room. What is required is that the seeds absorb a little moisture instead of losing any, and this the slightly damp soil permits of. When so preserved, sow them the very first thing in spring, just as soon as the frost leaves the ground. There need be no covering of leaves or straw to spring-sown beds.

“ Nurserymen prefer autumn planting, except for hickory-nuts, walnuts and a few such seeds which mice are apt to get away with, and these they sow in spring.

“ For autumn sowing, any time before the ground freezes will do, but be sure the seeds are not drying in the meantime. Seasons following sowings have much to do with the vegetation of tree seeds, and even experts sometimes fail to secure a crop.”

IMPORTANCE OF GRAFTING.—Were all forms of the art of grafting and budding to be taken from the horticulturist today, commercial fruit growing in its

high state of perfection would decay with the orchards now standing. All the common pomaceous fruits (apples, pears, and quinces), the stone fruits (peaches, plums, cherries, and apricots), and the citrus fruits (lemons, limes, and oranges), are now multiplied by grafting or budding. The progress in plant breeding and the great rapidity with which new sorts are now disseminated could not be attained without the aid of budding or grafting.

THE SCION AND ITS TREATMENT.—A scion is a portion cut from a plant, to be inserted upon another (or the same) plant, with the intention that it shall grow. The wood for scions should be taken while in a dormant or resting condition. The time usually considered best is *after the leaves have fallen, but before severe freezing begins*. The scions should be cut in about six-inch lengths from matured new wood from bearing trees of known variety; then tied in bunches and placed in moist sand, where they will not freeze and yet will be kept cold enough to prevent growth. Good results may follow cutting scions in the spring just before or at the time the grafting is to be done, but it is a much better plan to cut the scions in the fall.

THE STOCK AND ITS TREATMENT.—The stock is the tree or part of a tree upon which or into which the bud or scion is inserted. For best results in grafting it is essential that the stock be in an active, growing condition.

HOW TO CLEFT GRAFT.—When in the spring the sap begins to move in the stock, be ready; this occurs early in the plum and cherry, and later in the pear

and apple. Do the grafting, if possible, on a mild day during showery weather. The necessary tools are a chisel or a thick-bladed knife or a grafting iron (with which to split open the stock after it is sawed off smoothly with a fine-tooth saw), a hammer or mallet to aid the splitting process, a very sharp knife to trim the scions, and a supply of good grafting wax.



SPLITTING THE STOCK



TRIMMED SCION



SCIONS INSERTED



SECTIONAL
TOP VIEW OF SCIONS
IN PLACE



GRAFTING WAX
APPLIED

CLEFT GRAFTING : FROM START TO FINISH

Saw off a branch at the desired point, split the stock a little way down, and insert a scion at each outer edge—taking care that the inner bark of the scion fits snugly and exactly against the inner bark of the stock. This—together with the exclusion of air and moisture until a union results—constitutes the *secret of success*. Trim the scions wedge-shaped, as shown in the picture; insert them accurately; the wedge

should be a trifle thicker on the side which comes in contact with the stock's bark. Lastly, apply grafting wax. Each scion should be long enough to have two or three buds, with the lower one placed as shown. The "spring" of the cleft holds the scion securely in place, and therefore tying should be unnecessary. If both scions in a cleft grow, one should later be cut away.

GRAFTING WAX.—To four pounds of resin and one of beeswax add one pint of linseed oil; put in an iron pot, slowly heat and mix well. Pour out into cold water and pull by hand until light-colored. Keep in a cool place. To use, oil the hands, work the wax until soft, and apply around scions and cracks. If weather is warm, occasionally moisten hands in cold water.

Another recipe: One pound of resin, one-half pound of beeswax and one-quarter pound of tallow, melted together and applied with a brush. Keep in an iron pot; heat for use when wanted.

OTHER METHODS OF GRAFTING.—There are many other methods of uniting scion and stock, a few of which may be briefly mentioned,—although the average orchardist seldom has use for methods more complicated than the ordinary cleft graft:

Bark grafting: A branch is sawed off, as for cleft grafting, and the scions, instead of being inserted in a cleft, are cut very thin and slipped between the bark and wood, being inserted



HOW BARK GRAFTING IS DONE

far enough to bring the growing parts together. The bark is then securely bound and wax is used as in cleft grafting. It is an excellent method for grafting large limbs, as it injures the stock less than cleft grafting.



BRIDGE
GRAFTING

Bridge grafting, so-called, is merely a method for saving a girdled tree. Several upright scions are inserted in the bark, at top and bottom, thus furnishing bridges or connections through which the sap can flow. A good coating of grafting wax is then applied. If all goes well, the tree grows a new bark on the girdled part. The illustration explains the operation fully.



ROOT
GRAFTING

Crown grafting refers merely to a grafting operation (any style) performed on the stem at or near the surface of the ground.

Root grafting means the insertion of a graft in a stock which is entirely a root.

Saddle grafting is plainly shown in Fig. I.



FIG. I. SADDLE
GRAFTING

Shield grafting: The scion is cut very thin, as in bark grafting, and is inserted under the bark of the stock as a bud is inserted in the process of budding, and is firmly bound in place with waxed cord or raffia.



SHIELD GRAFTING

Side grafting: See illustration. A, B and C show how it is done.

Splice grafting is very simple. It is like whip grafting, minus the mortising. The two diagonally cut ends are fitted together ("spliced") and then held in place by a waxed tie.

Top grafting means, simply, the inserting of scions (by any desired method) in the branches of trees.

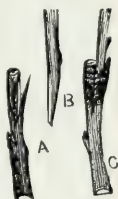


FIG. II
MAKING A NEW TOP

Many a worthless tree has thus been changed into a desirable variety. By using enough scions it is possible to make an entire new top on almost any tree. See Fig. II, and study the idea shown there. It is not best to cut away *too* much of the old tree at once; therefore, a few secondary branches are left, and these, after the scions are thriftily growing, can gradually be cut away the following season.

Whip grafting, also called "tongue grafting" (see Fig. III), consists of an exact "dovetailing" of scion into stock. Nurserymen use this method in special cases, and often in root grafting.

THE ART OF BUDDING.—This consists in taking a bud from one tree and inserting it under the bark of some other tree, says Farm Journal. The union of the two, the bud and the stock, takes place at the

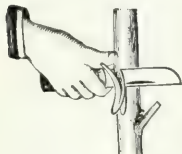


SIDE
GRAFTING



FIG. III
WHIP
GRAFTING

edges of the bark of the inserted bud. For this reason the bud should be inserted as soon as cut from its twig and before it has had time to dry out. The bud should also be full, plump and well matured, and cut from wood of the current season's growth. The stock should be in active growth so that the bark will slip easily. In cutting the bud a sharp knife is required,



CUTTING A BUD FROM
A BUD STICK



T-SHAPED
INCISION IN STOCK



RAISE THE
BARK, THUS



AND INSERT
THIS BUD



THEN TIE IT
IN PLACE



NEXT SEASON CUT
AWAY THE STOCK, THUS

BUDDING : FROM A TO Z

as a clean, smooth cut is desirable. The knife is inserted a half inch below and brought out the same distance above, shaving out a small wedge of wood under the bud along with the bark. This wedge is no hindrance to the union and should not be removed. The leaf is always clipped off.

To insert bud, make a T-shaped incision just through the bark of stock, as shown in the illustration. Raise the bark carefully without breaking it

and insert the bud. Practise will give ease and despatch to the operator. The bud must be held firmly to the stock by a bandage wound about the stock both above and below it, being careful to leave the eye of the bud uncovered. Raffia, bast, candle-wick or waxed cloth may be used for tying. In about ten days, if the bud "takes," the bandage must be removed, or the stock will be strangled and its growth hindered. The work of budding is usually performed in July or August in the North, and in June in the South. *When the bark peels easily and the weather is dry and clear, is the ideal time.*

There are other methods of performing this budding operation, but the one described is in most common use. Usually the buds are inserted in young seedling trees at a point close to the ground. This done, the operation is complete until the following season, when all the trees in which the buds have "taken" should have the top cut off just above the bud. (See illustration on page 26.)

BUDDING AND GRAFTING COMPARED. — The removal of the top forces the entire strength of the root into the bud, and, since the root itself has not been disturbed by transplanting, a more vigorous growth usually results from the bud than from scions in grafting.

The one objection to budding is that it causes an unsightly crook in the body of the tree, unless the tree is afterward planted deep enough in the orchard to cover the deformity.

The best methods of propagating each kind of fruit will be found in the special chapter relating to that particular kind.

SPROUTS FROM EXPERIENCE.

Repeated freezing and thawing while in a moist condition is destructive to most seeds.

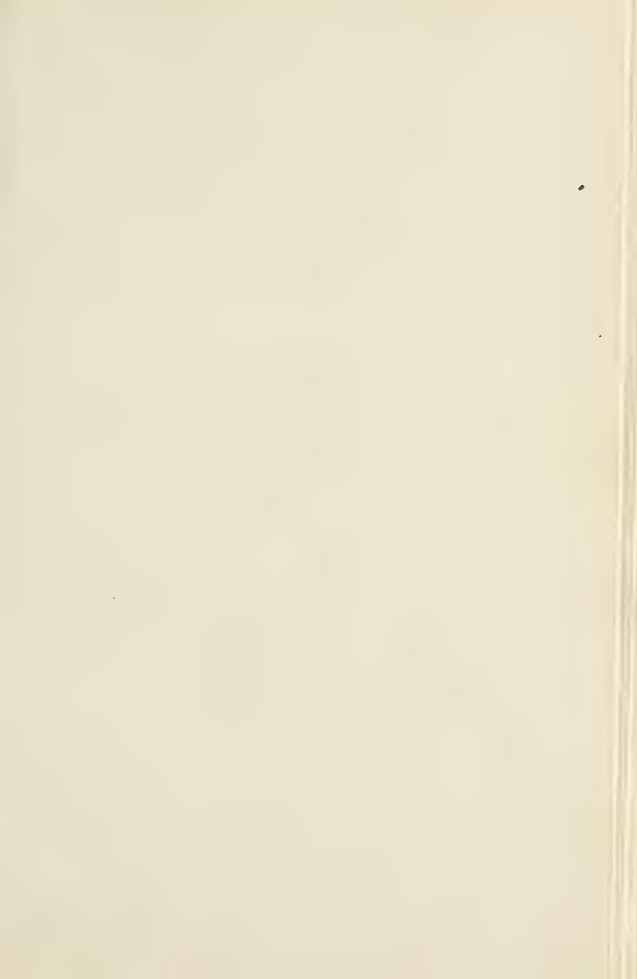
Tim says that orchard grafters are the only kind of grafter who don't get into trouble nowadays.

Be sure that your top grafts are not choked out by being overshadowed or interfered with by growth from the stock. If lice appear, soak the pests with strong tobacco-tea; do this early, before the leaves curl and hide the insects.

Cherry, peach and other pits should not be allowed to dry much after they are taken from the fruit. Wash them clean, dry in the shade sufficiently to prevent mold, and then stratify, or store as directed in the beginning of this chapter.

No use to attempt the grafting or budding of unrelated fruits; the pomaceous fruits, the stone and the citrus kinds, are families by themselves. For example: The pear works nicely on the pear, better on the quince, and not so easily on the apple, but you can't induce it to grow on the cherry or the plum. And vice versa.

Nurserymen frequently practise what they call "stratification"; it consists in placing layers of seeds alternating with layers of sand in a shallow box. This box may be buried or it may be set in a sheltered place and covered with leaves or straw to the depth of a foot. The object is to soften and decay the hard covering without starting germination. Freezing is beneficial in case of walnuts, hickory-nuts, peach pits, and the like, as it helps to crack the shells. Hence such seeds are sometimes stratified in boxes placed in sheltered spots on the surface of the ground, or they may be merely placed in a pile on the ground with a slight covering of leaves or straw. A special point to be guarded against in stratification is alternate freezing and thawing. Seeds receiving this treatment should be planted immediately upon being removed from stratification and before signs of growth appear. A few hours' exposure to wind and sun may prove disastrous.



RAMBO



KING

CHAPTER III.

SETTING TREES.

Trees are like children: In the beginning they give us a great deal of trouble and worry, but in the end we are proud of them.—Farmer Vincent.

Most planters make the mistake of setting their trees too closely together. It seems to them no better than an extravagant waste of ground to set little spindling trees so many feet apart, and it requires some imagination to think that the trees will ever completely occupy the ground. As the man stands off to survey his newly-set orchard, it actually seems as if there were nothing there! But if he could see that same orchard a few years hence, in his mind's eye, he would surely see the great wisdom of giving each tree plenty of "elbow room."

Here is a table of planting distances which is safe to follow :

Almonds,	16 to 20 feet each way.
Apples,	30 to 40 feet each way.
Apricots,	18 to 20 feet each way.
Cherries, sweet, . .	20 to 25 feet each way.
Cherries, sour, . .	16 to 18 feet each way.
Chestnuts, Paragon, About	30 feet each way.
Oranges,	25 to 35 feet each way. (Dwarf kinds less).
Peaches,	18 to 20 feet each way.
Pears, standard, . .	20 to 25 feet each way.
Pears, dwarf, . . .	12 ft. to 1 rod each way.
Pecans,	35 to 40 feet each way.
Plums,	18 to 20 feet each way.
Quinces,	12 feet each way.

After the tree planter has succeeded in conquering the temptation to crowd his trees too closely together, he is often bitten by another temptation—the “filler” idea. An orchard “filler,” as the word is usually understood, is a small-growing, short-lived tree,—something which begins to bear fruit quickly, and which can be cut out after a few years when it begins to crowd the main trees. In theory the idea seems all right, but in actual practise it does not often work out entirely satisfactorily. Usually the fillers are not cut out soon enough. It requires a good deal of pluck to chop down a nice tree, even if it is “only a filler.” Then, again, there’s often trouble because the transients and the permanents require different treatment. For instance, the full-strength Bordeaux mixture would be all right for apple trees but too strong for peach or Japanese plum trees; and the latter might require later or shallower cultivation than the non-producing apples.

The effect of distance between apple trees set about 1880, was recently studied in its relation to yield. The following four-year averages were found :

	Bushels per acre.
Trees not more than 30 x 30 feet apart,	186
Trees 31 x 31 to 35 x 35 feet apart,	222
Trees 36 x 36 to 40 x 40 feet apart,	229

Which goes to show that it does not pay to set trees too closely together.

The first thing to do in setting an orchard, is to lay out and mark the outer sides of the field, accurately,—these being the base lines from which to

work staking operations. Square the corners by sighting along a steel square laid on three stakes, the middle stake being exactly on a corner. When the four corners are thus established, measure and stake where the *outside* trees are to go, on two opposite sides of the square. But do not have these tree-places nearer than twenty feet to the outer limits of orchard field (if there are shade or windbreak trees on the orchard line, make the distance at least forty feet). Remember that when you come to work the orchard, you will want plenty of room on the outer edges,—to turn the team, the harrow, or the wagon.

The square system of planting is easiest and therefore most commonly used. Trees should be set exactly straight, because this adds to the looks of the orchard and facilitates cultivation. Here is an excellent method of staking and planting: Begin by using a small rope or wire, stretching this from one base-line to the corresponding stake on the opposite side; then put in small pegs along its entire length, the distance apart at which it is intended to plant the trees. After the whole orchard has been so laid out, take a double-staking board having three V-shaped notches in it. This board may be about four feet long and perhaps four inches wide; any thickness desired. Start at the first peg and place board so that the stake fits in the centre notch,—then remove this stake and put it in the notch made at one end of the board, and put another stake in the notch in the opposite end of the board; and continue until the whole orchard is double-staked in this way. A hole can now be dug between each two stakes. To do the planting the

staking-board is again brought into requisition and placed over the hole, so that the two stakes fit into the notches at the end. Then the young tree is held so that its trunk fits into the centre notch,—*just where the single stake stood before the double-staking took place.* In either double-staking or planting always work from one end of the row to the other, and always keep the centre notch of the board facing away



STAKING BOARD IN USE

from you. If one is careful in performing this work it is sure to turn out well. This sounds like a complicated operation, perhaps ; but really it is very simple and easy in practise. The picture plainly shows how the board is made and used, and it is hardly necessary to add that each tree is to be held exactly in place in the notch until most of the soil is shoveled into the hole

and firmed securely in place.

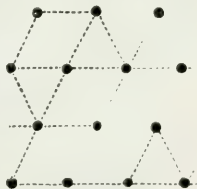
Number of trees required for an acre :

If set 12 feet apart,	302 trees.
If set 16½ feet apart,	160 trees.
If set 18 feet apart,	134 trees.
If set 20 feet apart,	108 trees.
If set 25 feet apart,	70 trees.
If set 30 feet apart,	48 trees.
If set 36 feet apart,	33 trees.
If set 40 feet apart,	27 trees.

(NOTE: The foregoing figures are based on the square system of planting. If the triangular method is used, about one-eighth more trees can be set on each acre.)

The one objection to planting in squares, says Lowell B. Judson, Idaho Experiment Station, is that it does not cover the ground uniformly with trees; for instance, A is farther from D, and B from C, than A from B or C, or B from D or A,—making a waste of space in the middle of the square. (See illustration.) This is sometimes utilized by planting a tree there, such as a peach or some quick-bearing or short-lived tree, temporarily to occupy the ground; but this results in crowding, in a very few years.

The best scheme for getting the maximum number of trees at a given distance apart on the land, is the hexagon or triangle system (sometimes called the septuple system), which makes every tree exactly the same distance from each of its neighbors. The accompanying diagram shows the arrangement, and the dotted lines make plain the triangles and hexagons. If each tree is joined to each of its neighbors by a straight line, a network of triangles will be formed, and each group of six triangles around each tree forms a hexagon with a tree in the centre. There are several ways of laying out an orchard on this plan, the most expeditious being to use a wire. The end stakes of the second row are most easily found by means of a wire triangle, each side of which is as long as the desired distance between trees.



TRIANGLE SYSTEM
OF PLANTING

Thomas Meehan gives the following directions for planting fruit trees received from a nursery, and he

has covered all the points so well that I can not do better than to quote his method:

"Quickly unpack stock upon arrival; shake out packing material; dip the roots in liquid mud. In case stock cannot be immediately set out, prepare a place where it can be temporarily planted, taking care to cover roots thoroughly, working the soil in among the fibres. Dig generous holes, provide good soil to fill



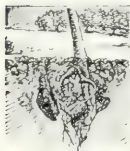
TREE SET TOO
HIGH

them; don't bend roots; cleanly cut off severely bruised or broken roots, and never let them dry. Dip them in mud, place in hole, throw good soil in hole, tightly ramming it around roots after each shovelful. Leave no air-pockets. After



TOO LOW AND
IN A HOLLOW

hole is filled, cover top of ground thickly with good, well-rotted stable manure as far as roots extend."



ROOTS BADLY
BUNCHED
TOGETHER

Look out for crown and root galls. Burn all such trees. Crown gall is a common disease in many nurseries and it attacks all kinds of fruit trees. It is the worst kind of folly to plant a tree which

has a trace of this disease, for not only is the tree pretty sure to die before it comes into full bearing but the infection may be spread to all parts of the orchard. If galls (knotty, bunchy swellings) are found at the



TREE SET
PROPERLY

base of tree trunk, the trouble is probably the fungous disease called crown gall; if found on the *roots* of apple trees, an insect called the woolly aphis is to blame.

USEFUL SIDE SHOOTS.

A tree out of place is a nuisance; in its place it is a blessing.

Do not let manure come in direct contact with the roots of young trees. Apply manure as a mulch.

An assistant is very helpful when setting trees. Two men, or a man and a boy, can work together to good advantage.

Better not dig holes much in advance of the tree-setting. Soil dries out quickly, and roots need moist earth around them.

Thrifty young trees are more apt to live than the larger, older ones. Young roots are smaller, and more apt to be all taken up in transplanting.

How deep should trees be set in the ground? A little deeper than they were set when growing in the nursery. Deep enough so that the joint between stock and scion is covered.

For measuring purposes a wire is better than a rope or cord, because it will not stretch. Stick a bit of solder on the wire, exactly where each tree is to come. String or bits of cloth tied on, are apt to slip.

As the tree-setting progresses, it is a good plan often to "sight" the rows across from side to side, both ways, to make sure that everything is exactly straight. The eye is an excellent detector of unsuspected crooks in rows.

In exposed situations or in windy localities, it is a good plan to incline the newly-set tree slightly toward the northwest or whichever point of the compass the strong winds come from. The trees will straighten as they grow.

One or two old blankets will come in handy when setting trees. As fast as an armful of trees is dug from the heeling-in place, wrap the roots in a blanket until all are planted. Don't let the roots lie around in sun and wind, unprotected.

The safest way when buying fruit trees is to dip them in the lime-sulphur mixture before setting them or heeling them in. Do this as a matter of precaution against the San Jose scale louse. The best way to fight this pest is to fight it from the very *beginning*.

Farm Journal says: "The other day we saw Peter Tumble-down on his way home with a load of loose fruit trees from a local nursery. The wind was blowing, the sun was hot, the trees were unprotected by even a blanket. Next year Peter will be finding fault with the nurseryman because the trees are no good."

How not to plant trees: "Dig a hole, do not trouble about its depth nor the space that will be required for the roots. If the soil consists of brickbats, it will do! Select a tree that is sure to be too big for its place in a short time. You can then cut off its branches and make it look like a real work of art, such as a clothes-prop or a gibbet. Plant the trees as thickly as possible, and forget to thin them out. You will then produce an immediate effect, and you will have the satisfaction of witnessing a fight—and appreciating a struggle for existence. Having planted your tree, stake it in such a way that the stem may be snapped off; this will give the wind something to do. Never think of removing the stake or loosening its ties—that would involve too much trouble. Avoid placing any guard around the newly-planted trees. In this way you will provide fodder for your neighbor's horse, which will graze contentedly on the bark; and you will provide healthful amusement for the boys, who will playfully score the bark with their knives." My good wife Harriet clipped these rules from an old publication, and she says that they are full of "contrary usefulness."



BEN DAVIS



RHODE ISLAND GREENING

CHAPTER IV.

PRUNING AND EARLY CARE OF NEWLY-SET TREES.

Take care of your orchard and your orchard will take care of you.—Harriet.

The newly-set tree must quickly be pruned. As it stood in the nursery row there was approximately a balance between the top and the roots, the latter being just about enough, under the conditions of that soil, to supply what moisture and nourishment the leaves and branches needed. Evidently if half of the roots were suddenly removed this equilibrium would be destroyed, and each leaf would show its distress at the decreased sap pressure, by wilting, and the weaker ones would probably die.

Now, that is essentially the condition of the nursery tree; no matter how carefully it was dug, many of its fine feeding roots are sure to have broken off, or have dried up; and until it can re-establish its relations with the soil, and put out new roots to take the place of those destroyed, it is totally unable to support and nourish the original amount of top. The fine root-hairs, which appear like fuzz near the tips of the smaller roots, and do most of the absorbing for the roots, dry out almost instantly on exposure to air, and are practically all destroyed in transplanting. It takes some time to form these anew, and if the whole top is left to "leaf out" during the process, the rapid

evaporation from so many points will result in disastrous drying of the whole tree.

That can be avoided by cutting back the top to correspond with the roots, thus reducing evaporation to the point where they can supply the loss. In the case of the yearling whip without side branches, it is sufficient to cut it off at the height at which it is intended the leader shall start out—say about two or



TOO HIGH TOO LOW CORRECT
CUTTING "TO" A BUD

three feet above ground. Always cut to a bud, making a sloping cut which leaves not more than a quarter of an inch projecting beyond the bud. During the summer all the buds along the side will de-

velop branches; all the lower ones and those not intended to form the main framework of the tree must be pinched off, otherwise the lower branches may make a shrub of your tree. Aim to throw all the strength of the growth into the required main branches.

Branched, or two-year-old trees, require a different style of pruning after being set. The lower limbs have generally been cut off by the nurserymen before the tree reaches the planter, so the height of the "head" is, in a sense, already fixed. What remains to be done is to choose three, four or five limbs to form the future framework of the tree. These should come out from the trunk in different directions, distributed as evenly as possible; and, if feasible, no

two branches should come out exactly opposite each other, or a weak crotch will be formed which may break and split at some critical time. Severely cut back the chosen limbs and remove all other limbs. Each of the remaining limbs should now be about six or eight inches long; usually with the terminal bud *pointing outward* on each. (If the variety's habit of growth is naturally very spreading it is sometimes best to correct this tendency, by cutting to terminal buds which point inward.)



READY TO PRUNE
NEWLY-SET APPLE
TREE

FORMS OF HEADS.—The apple, peach, plum, quince, sour cherry, and similar



SAME APPLE TREE
PRUNED IN OPEN-
CENTRE, STANDARD
FORM

trees, frequently seem best adapted to the open-centre, spreading, standard form. In such cases a central leading shoot is not needed or wanted. This matter is more or less a matter of choice. Some folks prefer a "leader," others do not.

The sweet cherry, pear, etc., often seem best suited to the upright, central-leader form. In such instances it is usual to have this main shoot a little longer than the side branches,—with its terminal bud pointing toward the direction of prevailing high winds.

PRUNING PEACH TREES.—It is customary to prune newly-set peach trees differently from most other trees.



NEWLY-SET PEACH
TREE, BEFORE
PRUNING

Whether the nursery tree is a branchless whip, or a well-branched tree, the *entire top* should be cut off at the point where a new head is wanted. If any branches remain below that point, those, also, are cut off,—not too closely, however; 'tis usually better to leave stubs about an inch in length, so as not to injure the remaining bud. Some peach growers cut off their trees at a uniform height of about one and one-half feet; others prefer a height of two, or two and one-half, or even three feet. The decision depends somewhat on the size of the trees, and the grower's personal preference; but there is no doubt that the lowest possible head, consistent with future cultivation, is most desirable. Two feet, or two feet and a quarter, is perhaps a happy medium.

THE "STRINGFELLOW METHOD."—A very severe kind of root and top pruning, known as the Stringfellow method, is sometimes advocated. The chief advantage claimed is that the roots grow straighter downward than with ordinary trees, giving greater



SAME PEACH TREE,
AFTER PRUNING

security against drought and high winds. The labor of setting is also much reduced, as a small hole will



NEWLY-SET PEAR
TREE, BEFORE
PRUNING

accommodate the stubbed roots, and it is an easy matter to pack the earth around them. The tree is, in fact, reduced to a cutting; but cuttings of woody plants are not apt to do especially well out-of-doors in this country. To grow a cutting successfully the soil should be as warm or warmer than the air, to stimulate the formation of roots before the top starts to grow; if the latter starts first, the demand for sap, and rapid evaporation, will quickly exhaust the juices of the

stem, and it dies. In the sandy soils of Texas, in which Mr. Stringfellow planted his trees, he had a natural propagating bed, a very warm soil and all the conditions to make cuttings do well. I will admit that some orchardists in other states have had more or less success with this method; but, personally, I prefer to plant my trees in the good old way—with all the roots on them possible. Tim says that he can't see any wisdom in cutting off a tree's entire stomach.

RECORD OF VARIETIES.—The best way to establish such a record



SAME PEAR TREE
PRUNED. CENTRAL-
LEADER FORM

is to make a detailed plan of the orchard as advised in Chapter I. The map should show the proper name, place and age of each tree. The next best way is to label the trees. Whatever you do, don't trust to memory.

A good tree label: Procure a thin piece of sheet zinc, six inches wide, from which cut strips crosswise three-quarters of an inch wide at one end, and tapering to one-eighth inch at the other end. Odd pieces of old zinc, stove boards, etc., may thus be utilized. After being cut, the pieces should be put in vinegar to allow them to corrode, after which an ordinary lead pencil will complete the business. Either or both sides can be written upon. And the writing will last

BALDWIN-MAR. 1906

for years, too, so that "he who runs may read"; as hundreds of labels in this vicinity can testify. The diagram explains the idea. Simply wrap the small end of label loosely around a limb of the tree—rather than around the trunk. As the limb grows, loosen the label somewhat, or change it to a smaller limb. On the reverse side of the label it might be well to write the name of the agent or nurseryman who furnished the tree; then, later, if the variety proves untrue to name, you will know whom to blame.

LOOK OUT FOR CLIMBING CUT-WORMS.—Thousands of newly-set fruit trees die every spring—"unaccountably." Usually, too, the nurseryman who furnished the stock is blamed; when, in reality, the trouble is often a climbing cut-worm that comes, like a thief in the night, to feast on the swelling, luscious buds. And, when daylight appears, he crawls down

and hides in the soil or under a stick. Oh, he's a sly fellow!

This slightly-reduced picture shows how this whitish pest looks when he's at work. Several methods of combating cut-worms have been invented, but one of the best ways is to fence them out. Fig. 1 gives



the idea. Cut some stiff tar-paper into strips about nine inches long and two or three inches wide. Put a strip around a tree trunk, tightly lap the edges an inch or more, and push the lower half of the circle into the soil—to anchor it and to prevent worms from easily burrowing beneath. It takes but a short time—and only a few cents—thus to protect several hun-

dred newly-set trees. All that is necessary is to have the paper at least an inch and one-half away from all parts of the tree; to have the edges lapped tightly; and to make sure that no worms are hid in the soil between the paper and the tree. Any kind of stiff paper, or wood veneer, or tin, will do; I prefer tar-paper because it is lasting and cheap.



FIG. 1

An orchard thus protected is safe for many weeks—until cut-worm danger is mostly over. Just why the worms do not “climb over the fence,” is a puzzle. But they very rarely do. These worms are less troublesome on heavy soils than on light soils. They seem to prefer sandy ground, in which they can more easily hide and propagate.

DANGER OF PREMATURE FRUIT-BEARING.—The act of bearing fruit is sure to stunt the growth of

very young trees. It pays to pick off the blossoms from all very young fruit trees. Two neighbors tried this in two similar cherry orchards. One man had the children pick off all blossoms each year; the other man didn't. At the end of five years the first man's trees were nearly twice as large as the second man's. (Age of trees, care and soil, were the same, otherwise.)

HINTS FOR THE HEEDFUL.

Don't forget to visit the young trees often and rub off all shoots which are not needed in the formation of the new head.

Don't overlook this fact: Success or failure with an orchard after it has been planted depends upon the care given the young trees for the first few years.

Many a nice little tree has been ruined because its owner forgot to remove the wire label that the nurseryman put there. Better look after those wires right away.

Don't neglect, after the first heavy rain in May, to throw two forkfuls of strawy manure around each newly-planted tree,—to keep the moisture in and to insure a good start.

If the location is a windy or unprotected one, don't forget in late summer to stake the young trees. But use cloth bands about the bark—not cord or wire, which would probably chafe and injure the tender trunks.

If the ground around young fruit trees is not kept constantly cultivated, the trees should be heavily mulched all summer. Straw or strawy manure is a good mulch. Newly-set trees have no depth of root and they dry out very rapidly.

Don't, as a rule, when pruning newly-set trees, cut "to" terminal buds which point *inward*. Why? Because, if you do, the new top shoots will be apt to grow in the direction the buds point, thus causing crossed limbs in the centre of the new tree-head.

The advantages of low-headed trees, says Prof. Bailey, may be mentioned as follows: Greater ease in picking, thinning, pruning and spraying, and less damage to trees and fruit from winds. Some growers object to low-headed trees on account of the greater difficulty of cultivating around them, but with proper pruning low-headed trees develop ascending branches which permit proper working with a team.

STAYMAN
WINESAP



TWENTY
OUNCE

CHAPTER V.

LATER PRUNING.

The ideal pruning consists not in checking growth, but in directing it.

Before touching saw or knife to a tree, the orchardist should have well in mind what he ought to accomplish by the work. Among the following are the chief objects sought:

1. To restore the balance between top and roots at time of setting out (as told in Chapter IV).

2. To make the top open-centred, regulate the number of limbs composing it, fix it at the proper height from the ground, and do away with weak crotches.

3. In older trees, to remove crossed branches, and thin them out to admit sunlight and thus facilitate spraying, ripening, etc.

4. To induce the production of fruit rather than wood, and vice versa; in other words, to correct shy bearing and overbearing.

5. To keep lower limbs out of the way of cultivation, and upper ones from growing out of easy reach of spraying, picking, etc.

6. To change biennial to annual bearing; in other words, to break a tree of the "off year" habit.



7. To correct a too compact or a too spreading growth of top.

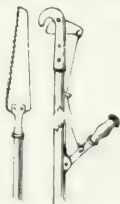
The "ideal" pruning, says W. N. Hutt, would consist in removing not branches but buds; not in checking growth but in directing it. It is less shock to the tree to pinch off buds here and there, than a few years later to saw off large, misplaced limbs. From the sap is manufactured both wood and fruit; it is better, therefore, to direct the energy of the mature tree toward growing fruit which goes to the cellar and market, than in making wood which goes to the brush pile. It is largely a question of the proper direction of the



THREE PRUNING TOOLS
MOST USED

energies of the tree. Many trees may be so formed and shaped when young that in later years pruning need be only slight, and it will never be necessary to cut out large limbs. Few of us, however, are able to live quite up to this ideal method, and so we often resort to the saw and shears.

WHEN TO PRUNE.—The time that pruning should be done is determined by the purpose such pruning is intended to serve. Pruning of trees to encourage fruitfulness should be done in summer when the trees are in active growth,—preferably in June. Pruning for wood growth, on the other hand, should be



LONG-HANDLED
TOOLS

done when the trees are dormant. The best time is in the spring before the buds start.

Pruning should not, as a rule, be done in winter time. When a wound is made in winter the delicate cambium bark layer is exposed to rough winds and low temperatures and is killed back for some distance between the bark and the wood. Every day of zero weather increases the trouble, and, in spring when growth starts, instead of the cambium starting at the cut to heal over the wound, it has to start considerably below. Frost-bitten wounds are slow to heal.

Thousands of fruit-growers invariably prune their trees in early spring,—not from any well-considered convictions as to the effect on the trees, but merely because it is the slack season of the year and therefore most convenient for pruning operations. These good folks should ask themselves this question: "Do I most need and want wood growth in my orchard, or fruit growth?"

If the orchard has been recently set, or if it is old and run-down, wood growth may be more desirable



THREE-YEAR-OLD PEACH TREE,
AFTER BEING PRUNED

for awhile. But if there *is* already sufficient wood growth, why prune at a time that forces more of it? Stop and think a bit.

GENERAL RULES FOR PRUNING.—Never cut away more wood than is necessary to obtain the end in view. Err on the side of cutting too little rather than too much, for if too much is taken off it can not be replaced in many years. Large crops of fruit can not be grown on trees with a few exposed branches. Cut out all dead wood as soon as it is discovered. If two branches rub together so as to injure one another, the weaker should be cut away. If one branch rests on the top of another, one should be removed. Head back and thin out the top rather than cut off the lower



FIG. I
PRUNING A SIDE
BRANCH

branches, so as to bring the fruit as low as possible, on account of thinning, spraying, and harvesting. Never remove entire side branches if it can be avoided. If it must be done, cut as shown in Fig. I; thus the tree is trimmed up for horse cultivation without sacrificing the whole of main limb.

All cuts should be left as smooth as possible; and all wounds more than one-half inch in diameter ought to be covered with a coat of thick linseed oil paint,—to keep out dampness and prevent rot while Nature is healing the cut.

Never leave a stub. Cut close, yet not too close. (See Fig. II.)

Cut out suckers on a tree whenever you see them. Also, watch for and cut



FIG. II
CUT AT 3 OR
2 IS WRONG.
NO. 1, RIGHT

off any suckers which may grow from base of trunk. Do this at any time.

When cutting off fair-size limbs, saw the underside of the limb about one-third of the way through, or till the saw begins to pinch, and then saw on top about one-half inch from the undercut; and when sawed down almost to the undercut the limb



FIG. III
CUT NOT SO



FIG. IV
CUT SO

will break off and not peel down the side of the tree.

(See illustrations, Figs. III and IV.)

Then continue the top cut so as to leave no stub.

Root-pruning is sometimes practised, the object being to check the growth of a vigorous tree (which is old enough to bear, but which refuses to do so), and thus favor the development of fruit buds. This operation is seldom necessary, however, and few orchardists ever attempt it.

Pruning a neglected old orchard is often a puzzling job. To do the work right, a vast amount of wood must come off, and, consequently, the average pruner is likely to remove too much, thus doing more harm than good. Here's a good rule for such cases: Do the job in three installments—one each year—and no installment unduly heavy.



THIS MAN IS
MAKING THE
MISTAKE OF
LEAVING A STUB

Keep all pruning tools sharp. Prune annually but not heavily. Never allow stock to prune your trees. Heavy pruning conduces to wood growth.

CUTTINGS.

Drastic pruning strikes at the vitality of the tree.

Never hurt the bark, bore holes, or drive nails into trees.

Unpruned, uncultivated orchards are not money-makers.

The orchard is not a profitable source of firewood, says Prof. Bailey.

A heavy pruning is always followed by a heavy growth of suckers.

The hatchet and the ax are not good pruning tools, says Farmer Vincent.

There is such a thing as having the head or centre of a tree *too* open. A happy medium is best.

Special pruning directions for each kind of tree will be found in the chapters devoted to The Apple, The Pear, The Cherry, etc.

Don't leave the pruning to ignorant or careless hired men. Do it right. The more the pruner knows, the better he can prune.

It is a common notion that the branches gradually get higher from the ground as the tree continues to grow. The apparent gain in height is due solely to the increase in diameter of the limbs, which soon begin to crowd if sufficient space has not been left between them. The centres of the limbs will always remain the same distance apart.

As regards the thinning out of the tops of the pear, apple, peach, and similar trees, no general rule can be given, as each tree presents a different problem. A thick growth of new branches results in weak bearing shoots and spurs. When cutting back limbs on bearing trees the cut should be made *just above a strong lateral*, wherever possible. The tendency of the sap will then be to flow into the lateral and thus prevent the formation of the numerous branches which nearly always result when a so-called stub-cut is made.

The orchardist should become well acquainted with the habit of growth of different varieties. A few kinds grow slowly and will not bear heavy pruning. Others are erect growers; and some are spreading. One can not expect entirely to overcome such tendencies, but they may be corrected to a marked degree. The upright varieties may be spread somewhat by pruning to *outside* laterals or buds, and the spreading kinds may be contracted by cutting to laterals or buds which have an *inward* direction. And by cutting back the vigorous growers each season, the limbs are made stocky, thus in great measure doing away with drooping branches.





CHAPTER VI.

CULTIVATION. FERTILIZATION. THINNING.

If a man isn't willing to curry and feed his orchard, he needn't expect thoroughbred results.—Tim.

The offices of tillage are several. Among the more important ones are :

1. The setting free of plant food by increasing the chemical activities in the soil.

2. The soil is made finer and hence presents greater surfaces to the roots, thus increasing the area from which the roots can absorb nutriment.

3. The surface of the soil is kept in such condition that it immediately absorbs all the rain that falls during the summer, when it is apt to be dry. Little is lost by surface drainage.

4. Moisture is conserved thereby. Where the surface remains undisturbed for weeks the soil becomes packed, so that the moisture from below readily passes to the surface and is evaporated, thus being lost to the growing crop. If the surface is kept light and loose by tillage, so that the capillarity is broken, but little of the soil moisture comes to the surface and evaporation is not so great. In this way nearly all the moisture remains in the soil, where it can be used by the roots.

5. Thorough tillage has a tendency to cause deeper rooting of the roots. The surface of the soil is made drier by tillage during the early part of the season than it would otherwise be ; hence the roots go where the soil is moist. The advantage of deep rooting during drought is obvious.

6. Weeds and grass are kept out.

CULTIVATION OF YOUNG TREES.—John A. Warder, in his book about apples, says: "If the ground, which has been appropriated to the orchard, be also occupied as farming land, as is usually done for a few years after planting, while the trees are small, it should be exclusively devoted to hoed crops; by which is meant those that require constant cultivation and stirring of the soil." That's the idea, exactly. While the trees are coming into bearing, and before they have need of all the land, we can kill two birds with one stone—*i. e.*, give tillage to the trees and cultivation to a



STRAWBERRIES IN YOUNG PEACH ORCHARD

marketable crop, all at one operation. We can, for several years, grow strawberries in rows, or potatoes, or some other cultivated crop. What we ought *not* to do, is to grow hay or any of the grain crops; nor should we let the land grow up to weeds. If we do not care to grow any crop on the land except trees (and some large orchardists prefer this method), we should plow the ground in early spring, and then harrow it regularly every two weeks until about August first,—at which time some "cover crop" is sown. (See Chapter IX.)

CULTIVATION OF BEARING TREES.—It rarely pays to attempt the growing of any “side” crop in an old, bearing orchard. The tree roots need—and occupy—all the ground. Plow the orchard just as soon as the soil is dry enough in the spring. Four inches deep is about right. One year plow “up” to the tree rows; the next year plow “away.”

Always plow in the same general direction. Endeavor to keep the surface about level during the growing season. Harrow the ground regularly and often. Stop cultivation about August first—later if season is dry, earlier if season is wet. Seed down to some cover crop.



THE ACME IS A GOOD ORCHARD HARROW

FALL-PLOWING OF ORCHARDS.—Some growers advocate a second plowing, to take place when regular cultivation ceases. They say: “Plow up to the trees so as to facilitate drainage during fall and winter; this ridging-up also helps to protect the roots from cold.” In some soils and climates the idea is perhaps sound; on properly-drained ground not too far north, it seems unnecessary. After August plowing, the harrow and the cover crop should immediately follow, of course.

SUBSTITUTE FOR CULTIVATION.—The “mulch system” has its advocates, and its faults and advantages. Its main faults are: It furnishes a harboring place for mice and insects; it does not stimulate tree growth, if growth is wanted; it favors fungous troubles. Its main advantages are: Lessened labor (which is somewhat offset by the necessity of mowing grass and weeds which may push through the mulch);

lessened wood growth (which in some cases might be temporarily desirable).

IRRIGATION.—In regions of normal rainfall, artificial watering of orchards is seldom practised or necessary. Cultivation, under normal conditions, conserves sufficient moisture for the trees' needs. In California and some other states, irrigation is desirable. Folks who need to practise this method should write to the U. S. Department of Agriculture, Washington, D. C., and ask for free Farmers' Bulletin No. 116, entitled, "Irrigation in Fruit Growing."



GOOD TILLAGE, THIS

FERTILIZATION.—Fruit trees need the same elements that are required by other crops—*i. e.*, nitrogen, potash and phosphoric acid. Nitrogen is particularly efficacious in promoting growth. In fact, the amount of growth and the color of foliage are reliable guides for the application of nitrogen. Leaves of good size and dark color, and a wood growth of a foot or more on mature trees in one season, indicate sufficient nitrogen.

Nitrogen is usually most easily, advantageously and cheaply applied in the form of legume cover crops (Chapter IX). Prof. Bailey, of Cornell, says: "In

orchards which are thoroughly tilled, the use of barn manures (which contain considerable nitrogen), should generally be discouraged. Use tillage and late green crops to supply the nitrogen,—except perhaps for a season or two when an attempt is making to rejuvenate a neglected orchard.” One of the main objections to stable manure is that it is apt to cause trees to grow too late in the fall.

Potash is generally the most important element to be applied directly to orchards, particularly after the trees have reached bearing age. The available store of potash in the soil is much increased by the thorough tillage which has already been recommended,



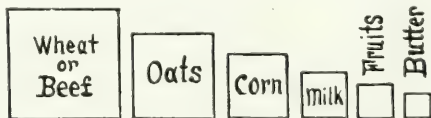
PEACHES WELL THINNED.
NO PROPS NEEDED HERE!

but in bearing orchards it should also be supplied every year in some commercial form. One of the best sources of potash for orchards is unleached hard-wood ashes. It gives fruit a high color. Twenty-five bushels to the acre is a good dressing.

Muriate of potash is perhaps the best and most reliable form in which to secure potash at the present time, says Cornell Bulletin No. 72. Commercial samples generally contain about fifty per cent. of actual potash. Kainit or German potash salts is a muriate of potash containing about twelve per cent. of potash. An apple orchard in full bearing and upon loose soil may receive as high as 500 pounds of muriate of potash per acre, but a normal and economical

application is from 200 to 300 pounds. Sulphate of potash is also thought to be a good form in which to buy potash. The commercial article will analyze about fifty per cent. of actual potash.

Phosphoric acid may be obtained in the form of a high-grade plain superphosphate (dissolved South Carolina rock), in bone compounds, and Thomas slag. The plain superphosphate contains about sixteen or eighteen per cent. of phosphoric acid, and 400 to 600 pounds per acre is a liberal and very useful dressing for bearing orchards. The bone fertilizers are always valuable. Those which are untreated give up their phosphoric acid slowly, unless they are very finely ground. Dissolved bone gives more immediate results. Thomas or basic slag has given good results in many tests, but it parts with its fertility very slowly. Phosphoric acid is rather less important in fruit plantations than potash, although this order is reversed in general farming.



A little lesson in fertility: The size of these blocks shows the *comparative* quantities of soil fertility (nitrogen, potash, and phosphoric acid) removed from the farm by the selling of various home-grown products. The growing of wheat or beef draws heaviest on the soil; butter or fruits, lightest. Remember, too, that most of the fertility removed by fruits is contained in the seeds or the pit,—the

fruits themselves are largely water. And that brings us to the important subject of

THINNING FRUITS. — If we can annually reduce the number of seeds (or pits) which a tree endeavors to grow, we remove a great vital drain upon the strength of both tree and soil. We save



PEACHES TOO THICK ON THIS
EIGHTEEN-INCH BRANCH

fertilizer, and we save tree vitality. Incidentally, we accomplish equally important secondary results. By removing, say, one-half of the baby fruit on a tree, the remainder is enabled to grow to larger and more profitable size; and next season the tree, not having exhausted itself the previous year, is in proper condition to bear another full crop. In brief, systematic thinning increases the value of the crop, and helps to insure full crops *every* year.

The time to do the work is after the June drop is about over and before the seeds or pits have hardened. Often it is necessary to pull off, by hand, almost two-thirds of the fruit on a heavily set tree; yet, strange as it may seem to those who have not tried it, the



SAME BRANCH PROPERLY
THINNED

remaining one-third, at picking time, will fill almost as many bushels as the fruit of a similar tree unthinned. Which would be most profitable, ten bushels of "mediums" or eight or nine bushels of "extra large"? It frequently pays to hire help to do the thinning.

NOTEBOOK JOTTINGS.

Cultivation should be shallow — two or three inches at most.

A rope or handle to the harrow helps to guide the implement.

If you grow cultivated crops in a young orchard, never let the crop come closer than four feet to any tree trunk.

Many orchardists say: "Don't plow or cultivate fruit trees while they are in blossom. May cause the embryo fruit to drop."

When applying fertilizer, remember that a tree's root area is usually as large around, or larger, than its top area. Don't pile tree food around the trunk,—spread it farther out.

Use a one-horse plow for the first two or three rounds along a tree row. Do this to all the rows. Then change to a two-horse plow, and finish the job. This makes easier, closer work.

If you decide to mulch, do it right. Don't permit yourself to mow the grass which pushes through the mulch, and then remove the clippings. Let the mowed grass lie on the mulch.

Why should cultivation usually cease about August first? So as to allow the new growth to stop growing and harden up in proper mature condition for the winter. The new wood on late cultivated trees is more apt to winter-kill.

Muzzle the horses when plowing or cultivating around trees. Yes, and don't forget to pad the outer end of each whiffletree. Pad the outer edges of the harrow, too. But if a tree is accidentally "barked," bandage the wound with cow manure and burlap.

Rules for thinning fruit: Remove all wormy, crooked or otherwise inferior specimens. Only the best specimen in each cluster should be allowed to remain. Remaining fruits should not be closer together than five or six inches apart. Properly thinned trees need no props.

Learn how to harrow an orchard so as to cover practically all the ground. Harrow lengthwise one time, crosswise another time, and diagonally the third time; then repeat. A careful driver will thus leave only a few inches of untouched ground around each tree trunk—and a hand hoe easily finishes that.

Sometimes it is desirable to "seed down" to grass, for a year or so, a thrifty, well-grown pear, apple or cherry orchard. Plum, peach or dwarf pear, never. And, in any case, such a course is seldom best until the trees have reached the bearing age; then, a temporary seeding down may be beneficial,—first, because it may induce quicker fruitfulness by checking growth; or, second, it may prevent the bark-burst or pear blight which a too rapid growth sometimes promotes.

PLATE VI



SPRAYED FRUIT



NOT SPRAYED

CHAPTER VII.

SPRAYING.

*Spray, farmers, spray with care,
Spray the apple, peach and pear;
Spray for scab, and spray for blight,
Spray, oh spray, and do it right.*

Yes, that's the entire secret—"Do it right!" Every year there is a great deal of spraying that does very little good. Many individuals go through the operation and simply waste time and money. I have observed that unless the operator is very careful there will be fruits and even large areas on the trees, left unsprayed. In many cases the operator sprays the lower limbs of the trees heavily, but the topmost twigs, and even the centre, are left dry, and then he wonders why spraying does not produce better results.

If you are a fruit-grower—actual or prospective—make up your mind to the fact that a good spraying outfit is just as important to your success as a plow or a pruning saw. The kind of an outfit which you require depends, of course, on the size of your orchard. If there are only a few trees, of



FOR A FEW TREES, NOT
TOO LARGE, THIS COM-
PRESSED-AIR SPRAYER
IS ALL RIGHT

medium size, perhaps one of the new-style, compressed-air, shoulder-strap sprayers (sold by seedsmen and implement dealers) will answer the purpose. Or if the trees are large or numerous, you may require

a barrel or tank outfit, mounted on the farm wagon and worked by hand; or perhaps your requirements may necessitate one of the power outfits which are operated by either a gasoline engine, geared connection with wagon



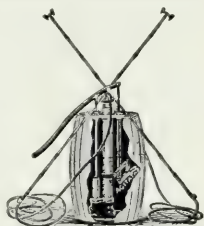
POWER SPRAYING FOR LARGE ORCHARDS

wheels, or compressed gas in cylinders.

Before deciding upon a pump, or buying one, take a bit of the same advice that Harriet once gave to me: "Write to advertisers in the Farm Journal or other farm papers, get their catalogs and price lists, and then study, compare, and decide."

A good pump should work easily, maintain a steady spray from one or several nozzles, be simple in construction, have non-corrosive brass working parts, be durable and able to stand hard use, be easily taken to pieces for repair, have pipes properly arranged to prevent clogging, and be provided with an agitator which keeps the solution in vigorous motion and thoroughly distributed. Judging a pump

by cheapness alone often proves poor economy. For a very finely divided spray the Vermorel nozzle seems the best of any tested at the Station, says F. H. Hall, Geneva, N. Y., and that form should be chosen which is provided with a joint between nozzle chamber and elbow, to allow easy access in case of clogging. The Non-clog, the Mistry and several other nozzles, are also popular, either in the single, double or triple form. A light bamboo pole, enclosing a brass tube and fitted with proper connections, seems the lightest and simplest means for raising the nozzles; this with a light framework tower erected in the wagon or cart upon which the operator may stand, will usually afford sufficient elevation for even tall trees.



BARREL SPRAYER —
SUITED TO MEDIUM-SIZE
ORCHARDS

Spraying mixtures are divided into two classes: Fungicides and insecticides. Often, however, it is practicable to unite the two into one spray—and thus fight both fungus and insects at the one operation. A mixture of Bordeaux solution and an arsenical poison, is a good example of such a combination. Bordeaux mixture is one of the best and most useful of all known fungicides for general use.

BORDEAUX MIXTURE.—Three pounds of sulphate of copper, four pounds of quicklime, fifty gallons of water. First, dissolve the copper sulphate. The easiest, quickest way to do this, is to put it into a coarse cloth bag and suspend the bag in a receptacle

partly filled with water. Next, slake the lime in a tub, and strain the milk of lime thus obtained into another receptacle. Now get someone to help you, and, with buckets, *simultaneously* pour the two liquids into the spraying barrel or tank. Lastly, add



MAKING BORDEAUX

sufficient water to make fifty gallons. (For making this mixture on a large scale, an elevated platform—with pipes, etc., as shown in cut—is very handy.) 'Tis safe to use this full-strength Bordeaux on almost all foliage,—except on peach trees, Japanese plums, and similar tender trees. For these it is wiser to use the following half-strength mixture :

ELEVATED PLANT FOR
MAKING BORDEAUX ON A
LARGE SCALE

Half-strength Bordeaux:
One and one-half pounds copper sulphate, two pounds lime, fifty gallons water.

BORDEAUX COMBINED WITH INSECT POISON.—By adding one-quarter pound of Paris green to each fifty gallons of either of the Bordeaux formulas, the mixture becomes a combined fungicide *and* insecticide. Or, instead of Paris green, add about two pounds of arsenate of lead. The advantages of this over Paris green, are, first, it is not apt to burn foliage even if used in rather excessive quantities; and, second, it “sticks” to the foliage, etc., better and longer. It is the best form in which to use arsenical poison.

(Note: Seedsmen sell ready-prepared forms of most of the mixtures, etc., mentioned in this book.)

A NEW FUNGICIDE.—Some orchardists are now using the following self-boiled lime-sulphur spray (or, sometimes, a very dilute form of ordinary lime-sulphur,—see page 66), claiming that it is less liable to spot or burn fruit and foliage:

Put eight pounds unslaked lump lime in a barrel; add enough water to cover. When the lime begins to heat, throw in eight pounds of flowers of sulphur. Constantly stir and gradually pour on more water until the lime is all slaked; then add the rest of the water to cool the mixture. About fifty gallons of water, in all, are required. Strain.

Two pounds of arsenate of lead may be added, if desired, to the finished mixture, which then becomes a combined fungicide *and* insecticide, and may be used in the same manner as advised for Bordeaux-arsenate of lead.

(Special note: The self-boiled mixture is *not* the same as the lime-sulphur advised for San Jose scale, which is too strong for trees in foliage.)

FOR SUCKING INSECTS.—Now we come to a class of insecticides suited to insects which suck a tree's juices but do not chew. Arsenic will not kill such pests; therefore we must resort to the following solutions which kill by *contact*:

Kerosene emulsion: One-half pound of hard or one quart of soft soap; kerosene, two gallons; boiling soft water, one gallon. If hard soap is used, slice it fine and dissolve in water by boiling; add the boiling solution (away from the fire) to the kerosene, and stir or violently churn for from five to eight minutes, until the mixture assumes a creamy consistency. If

a spray pump is at hand, pump the mixture back upon itself with considerable force for about five minutes. Keep this as a stock. It must be further diluted with soft water before using. One part of emulsion to fifteen parts of water, is about right for lice.

Whale-oil soap solution: Dissolve one pound of whale-oil soap in a gallon of hot water, and dilute with about six gallons of cold water. This is a good application for the young lice of the oyster-shell and scurfy scale (see Chapter VIII), or for aphids.

Tobacco tea: This solution may be prepared by placing five pounds of tobacco stems in a water-tight vessel, and then covering them with three gallons of hot water. Allow to stand several hours; dilute the liquor by adding about seven gallons of water. Strain and apply. Good for lice (aphids) on foliage.

SPECIAL REMARKS.—No attempt has been made in this chapter to cover the various fungous troubles and insect pests which do damage to orchards and fruit,—such topics being more appropriately treated in the chapters on The Apple, The Pear, etc. There you will find special directions which fit the special pests which prey on each kind of fruit. Scale insects have a chapter all to themselves.

Tim wants me to say that fungicides are not cures, but *preventives*. "Therefore," he concludes, "the early bird catches the germ." By which he means, of course, that the sprayer should begin early in the season,—before fungous trouble has really begun. "Yes," adds Harriet, "and he should repeat the good work several times, at intervals two or three weeks apart."

HELPFUL HINTS.

Bordeaux mixture is best when used a few hours after being mixed.

After spraying, pump air or water through the pump and hose to clean them of the mixture, so that it shall not needlessly corrode them.

All spraying mixtures should be constantly agitated when in use. If this is not done, some of the ingredients (particularly Paris green) are apt to settle to bottom of tank or barrel.

A properly thrown spray is a fine mist, like steam; it shouldn't be a fall of raindrops. It should settle on a tree like dew, and there need be very little "drip" upon the ground.

Never spray trees while they are in blossom. No need to do it, and it would kill the orchardist's best friend—the bees. Without bees, blossoms would not be properly cross-fertilized.

Don't try to cover all sides of a large tree at one operation. Take one side along the row, then when the wind is favorable come back on the other side (for lack of this precaution many trees are half-dead on that "other" side).

If rain falls immediately after an application, it must be repeated as soon as the plants are fairly dry again. But if the mixture once gets dried on the foliage it may adhere fairly well in spite of rains. Some mixtures stick and last much better than others.

A few fruit-growers favor the dust method of spraying. Instead of liquids they use powdered forms of insecticides and fungicides, blown into the trees by means of special apparatus. The idea doubtless has some good points, but a liquid spray seems to suit most folks best.

A. W. Cheever tells in *Farm Journal* of a contrivance that will be a boon to the man who holds the sprayer rod,—consisting



of an extension to prevent the liquid getting on the hands. The pipe has a rod attached set off about four inches, for grasping by the hands. This does not get wet as does the tube.

Straining Bordeaux mixture: No matter what quantity of mixture is to be made up, it is necessary to strain the materials through a good strainer. The best type of strainer is made of brass wire, with eighteen or twenty meshes to the inch. If all the copper solution and milk of lime are separately strained, it

will not be necessary to strain the Bordeaux mixture itself. Some very good strainers made of copper are on the market and may be obtained from the makers of spray pumps. One of the best, which can be made at home, is in the form of a box.

In place of the self-boiled mixture, a number of orchardists are trying dilute forms of the concentrated lime-sulphur mentioned in Chapter VIII. A dilution of one part concentrate to about thirty parts water is thought safe. (For peach trees, the self-boiled mixture is safer, I think.)



Here is a picture of a disc-shaped spraying-rod shield. 'Tis a handy little contrivance for preventing the spray-drip from running down the rod on to the hands. Can be made of metal or wood, tightly fitted.

It has been established that in the case of the apple crop, spraying will protect from fifty to seventy-five per cent. of the fruit, which would otherwise be wormy, and that in actual marketing experience the price has been enhanced from \$1 to \$2.50 per barrel, and this at a cost of only about ten cents per tree for labor and material.

In the case of one orchard in Virginia, only one-third of which was sprayed, the result was an increase in the yield of sound fruit in the portion treated, of nearly fifty per cent., and an increase of the value of this fruit, over the rest, of one hundred per cent. The loss from not having treated the other two-thirds was estimated at \$2,500.

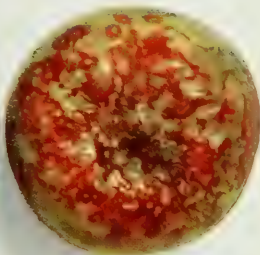
It must be remembered that most spraying materials are poisonous and should be so labeled. If ordinary precautions are taken there is no danger, to man or team, attending their application. The wetting, which can not entirely be avoided, is not at all dangerous, on account of the great dilution of the mixture. Nor is properly sprayed fruit unsafe to eat.

In large orchards much time may be saved by preparing and keeping on hand separate stock solutions of the lime and copper, instead of constantly making up a new batch. Dissolve forty pounds of copper sulphate in as many gallons of water. A gallon of the solution will thus contain one pound of the copper salt. In a similar way a stock solution of lime may be prepared. Keep both solutions tightly covered and thoroughly stir before dipping from either. It is then a very simple matter to take three gallons of the copper solution, four of the lime, and dilute to the requisite amount—according to the regulation Bordeaux formula.



PLATE VII

EFFECTS OF LEAF-BLIGHT
ON PEAR AND LEAF



SAN JOSE ON PEAR



SAN JOSE ON PEAR

CHAPTER VIII.

SCALE PESTS: SAN JOSE, OYSTER SHELL, SCURFY, ETC.

If hogs or cattle could multiply as fast as scale lice, human beings would soon be crowded off the earth.—Dorothy Tucker.

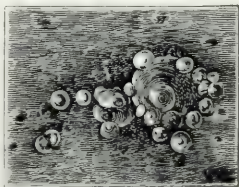
The most serious insect pest which confronts the orchardist of today, is undoubtedly the San Jose scale louse. It came to this country on nursery stock from Japan, and first took root in San Jose, Cal. It is supposed that it was brought east to New Jersey about twenty-five years ago, and it has spread until now it menaces the larger part of the United States.

In a single season a female may become the progenitor of 1,608,040,200 individuals. The louse hides under a scale that is impervious to most insecticides.

It attacks all orchard trees, roses, small fruit bushes, and many lawn shrubs and vines.

The louse can crawl rapidly, and is often carried by birds, insects and heavy winds.

The insects are too small to be easily seen with the naked eye, but the scale can be seen. Bark of affected trees has a grayish or ashy appearance, in bad cases. It is the louse and not the scale that does the harm.



ADULT FEMALE SAN JOSE
SCALE WITH YOUNG
(ENLARGED, AS SEEN
THROUGH A MAGNIFYING
GLASS)

Now search all of your sick trees, and here is a description that will help you: The San Jose scale is rather flat, round, pressed close to the bark, and often is grayish, or resembles the bark of the twig in color; when fully grown is about one-eighth of an inch in diameter. At or near the middle of each scale is a small, round, slightly elongated, black point or nipple. Badly infected trees are covered so thickly that the bark is completely hidden. Such trees must be destroyed or severely pruned and thoroughly sprayed. A magnifying glass (the Farm Journal folks sell a good one for fifty cents) should be a part of every modern orchardist's equipment. Now remember: *A round, dark scale with a central dot or nipple.* That's the idea, in a nutshell. (When found on the fruit, each scale is usually surrounded by a reddish ring. See colored plate VII.)

The best time to fight the San Jose is in the early spring while the leaves are off and before the buds swell, but if your trees are badly scaled over, and half dead, it will never pay to try to save such trees; dig them up at once and burn every vestige of them. Do not lose a day in this; *now* is the word. Near every badly affected tree will be found other trees that show the scale to the close observer; these may be left standing until winter. Then, soon after the leaves drop, spray the trees; and, if you wish to be thorough, follow this with a second spraying in early spring before the buds open.

Since the Farm Journal, a number of years ago, brought the lime-sulphur spray to the attention of fruit-growers east of the Rocky mountains, many

other things have been tried, but to little purpose. The same lime-sulphur mixture is still the sovereign remedy on the Pacific coast, no other material being used there to any extent as a scale spray; and elsewhere in the United States it is the best thing yet found. It is effective wherever used, if directions are followed, and it is safer to use than the oil remedies sometimes recommended.



AN ILLINOIS LIME-SULPHUR OUTFIT. STEAM-
COOKING IN ELEVATED BARRELS

Formula for making the lime-sulphur spray: Slake twenty-two pounds of fresh lump lime in the vessel in which the mixture is to be boiled, using only enough water to cover the lime. Add seventeen pounds of sulphur (flowers or powdered), having previously mixed it in a paste with water. Then boil the mixture for about an hour in about ten gallons of water, using an iron but not a copper vessel. Next add enough more water to make, in all, fifty gallons. Strain through wire sieve or netting, and apply while mixture is still warm. A good high-pressure pump is essential to satisfactory work. Coat every particle of the tree.

Concentrated lime-sulphur: Several good ready-prepared mixtures are now on the market, and are successfully used by orchardists who do not care to bother with home mixing. These commercial mixtures merely need diluting with about eight parts of cold water, and are then ready to use; thus they prove very convenient for the man who has only a few trees, or who does not mind the slightly greater cost of the factory product.

Caution: The lime-sulphur mixtures given in this chapter *must not* be applied to trees that are in foliage; use on dormant trees, only.

The month of March is the best month in which to spray, if only one application is given. But oftentimes the work can be done in February to better advantage. Some orchardists spray twice,—in the fall after the leaves drop, and again in the early spring.

Summer or early fall spraying with one pound of whale-oil soap dissolved in five or six gallons of water, may help to hold the San Jose scale lice in check until late fall or early spring applications of the lime-sulphur mixture can be made. Whale-oil soap solution will not hurt foliage. Or try the self-boiled or mild form lime-sulphur mentioned in Chapter VII.

George T. Powell, of New York State, says that he is getting interesting results in an attempt to dwarf standard trees. They are kept low headed. He prunes them in July to check the growth,—cutting them well back; then in September when growth has practically ceased, he prunes off any shoots which have started *since* July,—thus leaving only the sound mature wood to go through the winter. He has nearly 1,000 trees

three years old that have had this treatment for two years. The Rome Beauty has set apples freely this, the third year, which he has taken off, but there is a large development of fruit spurs and fruit buds for next year. For this treatment, the soil must be good, culture the best, with heavy thinning of the fruit, which means practically No. 1 and fancy apples only grown on such trees. He thinks that he can keep, under the treatment, standard trees about twenty feet high for many years. His idea is that the old high trees will all pass out rapidly through the ravages of the scale louse, and that the smaller trees must replace them because of greater ease and effectiveness in spraying.

I think friend Powell is on the right track. Low-headed, low-pruned, apple and pear trees—if success is to be achieved in the future. With low trees and thorough spraying, no one need greatly fear San Jose.

OYSTER-SHELL BARK-LOUSE.—The most common scale-insect of the apple, without doubt, is the oyster-shell bark-louse. Although everywhere present, and sometimes quite conspicuous, it most often attacks trees that for some reason are unhealthy, and therefore poorly fitted to support the extra drain put upon them by the pest.



OYSTER-SHELL
BARK-LOUSE
(ABOUT
FULL SIZE)

The scales of these insects are elongated, shaped something like oyster-shells, with the cast skins at the smaller ends. They are brown in color. Underneath a scale will be found a cluster of yellowish-whitish eggs,

plainly to be seen through an ordinary magnifying glass. The scales are about one-eighth inch in length, or smaller, and they usually cluster together as shown in the illustration on page 71.

About the middle of May (later or earlier, according to latitude) the eggs under the scales hatch into tiny lice which appear as mere specks to the unaided eye. These lice, for a few days, move around on the bark.

Remedies : First, give the tree a tonic and a good rub-down. Fertilizers, pruning and cultivation will help the tree to better general health ; and a brisk scrubbing of trunk and main limbs with a very stiff brush or scraper, will get rid of many of the scales. An old broom with the brush cut short makes an excellent scrubbing implement. Keep it wet with whale-oil soap solution. Then, sometime in May, watch for the hatched-out lice. When they appear, get out the spray pump and thoroughly spray the entire tree with whale-oil soap solution, made as follows : Dissolve one pound of whale-oil soap in a gallon of hot water, and dilute with about six gallons of cold water. (Note : The oyster-shell louse is especially fond of the lilac.)



SCURFY
SCALE
(ABOUT
NATURAL
SIZE)

SCURFY BARK-LOUSE.— Another scale insect, that may be classed with the oyster-shell bark-louse so far as its economic importance is concerned, is the scurfy bark-louse of the pear and apple. This scale is white in color, and, like the oyster-shell pest, is most apt to work on poorly fertilized and poorly cultivated trees. The scurfy scale is readily recognized on account of its whitish, cotton-like

appearance, and its oblong shape. The eggs beneath the scales are in clusters, purplish in color, and they hatch out about the same time as the oyster-shell eggs.

Remedies: Same as for oyster-shell bark-louse. (Special note: There is no better remedy for *all* scale insects, than strong lime-sulphur spray. Those who use it on their trees in the winter, are all right. But when tree growth is beginning, it is better to fight oyster-shell and scurfy bark-lice with whale-oil solution. Or kerosene emulsion may be used.)

OTHER SCALE PESTS.—A variety called the “plum scale” is sometimes found on plum trees (and occasionally on quince, apple, pear, cherry and peach trees). Of this scale pest Prof. Slingerland says: “They remind one of small halved peas colored dark brown and stuck on the branches.” They belong to the scale family named *Lecaniums*, which includes the “terrapin scale,” the “apricot scale,” and so forth.

Olive and citrus fruit-growers in California, Florida, etc., have a long list of scale troubles of their own. The same remedies advocated for other scale pests will prove equally successful when applied to the plum or citrus or olive scales.

FOOT NOTES.

Concentrated lime-sulphur similar to commercial solutions may be made at home, if desired. Get formula from your State Experiment Station.

Ladybirds are among the most active destroyers of scale insects, and the most abundant of these beetles is the twice-stabbed ladybird.

All dead wood and thick brush should be cut out before attempting to spray; and all branches that are too high to reach and cover with the spray liquid should also be cut off.

Protect the hands by coating them with vaseline or by wearing gloves—rubber being the least injured by the lime sulphur spray. Cover the horses. Spray only with the wind, if it be too strong to spray against it. It is impossible to throw the spray satisfactorily against a very strong breeze.

Special note: Many folks do not fully realize that strong lime-sulphur spray is a splendid fungicide as well as a louse-killer. Therefore its use may take the place of the *earlier* Bordeaux applications, before the buds have opened. For later fungous sprays, use Bordeaux, or the mild self-boiled lime-sulphur.

A fifty-gallon barrel makes a very convenient unit for even the most extensive spraying operations, says M. B. Waite. Here is a plan of a lime-sulphur boiling plant of six barrels, rather similar to the model of J. H. Hale. (Fig. I shows general view; fig. II shows details of one barrel.) The boiler rests on the ground, the barrels and the water-supply pipe on an elevated platform about eight feet

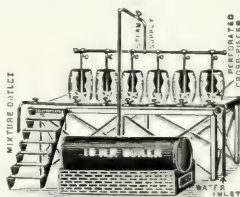


FIG. I. HALE'S STEAM COOKER



FIG. II.
BARREL
DETAILS

from the ground. The outlet is terminated by about three feet of flexible hose, through which the finished mixture can be piped to the wagon tank as wanted. The steam is conducted directly into the bottom of each barrel, escaping into the liquid through the perforated crosspieces, and then bubbling up and out. The water inlet and outlet pipes have no connection, of course, with the steam pipes. Stop-cocks should be located as shown—fifteen in all. (A scientific friend of mine suggests that a steam coil in the bottom of each barrel, through which steam could pass and then *return to the boiler*, would be more economical of steam and of fuel. He says that it's wasteful to allow the steam to escape in the barrels.—J. B.)

PLATE VIII

YORK
IMPERIAL



NORTHERN
SPY



CHAPTER IX.

COVER CROPS.

FALL, WINTER AND SPRING CARE.

Orchards, as well as folks, need winter overcoats.—John Tucker.

The seven important advantages of a cover crop in the orchard are: 1st, to supply nitrogen and organic matter or humus to the soil; 2d, to improve the mechanical condition of the soil, *i. e.*, to lighten a heavy soil or make a light soil more retentive of moisture; 3d, to protect the roots from being injured by deep freezing; 4th, to prevent the fine particles of soil and plant food from being washed away during the fall, winter and spring; 5th, to catch and hold snow and leaves; 6th, to help check late growth of trees in the fall, and thus aid wood growth to harden up for winter; and, 7th, to pump the surplus water out of the soil in early spring so that the ground may sooner get into condition for plowing.

An orchard cover crop is a crop sown to cover the ground during that portion of the year when very little or not any growth is being made by fruit trees. If a man makes no effort to cover the ground with economic plants, then Nature steps in and starts weeds and grass in the endeavor to protect the soil. Cover crops are usually sown just before the last cultivation of an orchard—about August first. Sometimes as early as July, or as late as early September.

There are practically two classes of plants which the orchardist may use for the purpose of securing

a cover crop, says John Craig, Cornell Experiment Station, New York. These are: the nitrogenous class on the one hand and the non-nitrogenous class on the other. The difference between these two is marked by the power of the plants of the nitrogenous class to appropriate the free nitrogen of the air and store it up in their tissues in such a way that it is more or less readily available to the succeeding crops. Prominent among plants which have this property are the clovers, peas, beans and vetches. These are the farmers' friends—the "nitrogen collectors."

Prof. C. P. Close, Delaware, says:—"The amounts of seed per acre, and crop or combination of crops which may be used, are about as follows: Rye, one to one and one-half bushels; cowhorn turnips, one to two pounds; dwarf Essex rape, eight to ten pounds; red, mammoth or crimson clover, fifteen to twenty pounds; cowpeas, ninety pounds; soy beans, ninety pounds; hairy vetch, forty to fifty pounds; hairy vetch, forty pounds, and rye, thirty pounds; hairy vetch, twenty pounds, and cowpeas or soy beans, forty-five pounds; hairy vetch, twenty pounds, and turnips, twelve ounces; hairy vetch, twenty pounds, crimson clover, eight pounds, and turnips, eight ounces; hairy vetch, twenty pounds, and red, mammoth or crimson clover, eight pounds; turnips, eight ounces, rye, twenty pounds, and red, mammoth or crimson clover, four pounds; turnips, twelve ounces, and crimson clover, eight pounds; turnips, twelve ounces, and soy beans or cowpeas, forty pounds; dwarf Essex rape, four pounds, and rye, one bushel; rape, four pounds, soy beans or cowpeas, forty pounds,

and rye, twenty pounds; alfalfa, fifteen pounds, and red, mammoth or crimson clover, seven and one-half pounds."

Many other combinations may be used successfully. The object should be to use such a mixture of crops that a part at least shall live over winter. A few of the foregoing combinations contain all fall crops and for that reason are not so desirable as though they contained a part of those that live through the winter and grow in the spring. Oats, one bushel, crimson clover, ten pounds, is by many fruit-growers considered a good combination. For cold climates try the following: Hairy vetch, forty pounds; oats (or rye), thirty pounds. Crimson clover often winter-kills.

FALL, WINTER AND SPRING CARE.—This consists of several things, the most important of which are: Protection against injury by mice or rabbits; protection against sun-scald; protection against live stock; careful oversight of drains and drainage; safeguarding, so far as possible, against late spring frosts at blossoming time; and hunting for borers. Hints on these and other subjects will be found in the following

HELPS FOR FRUIT-GROWERS.

A bolt put in, now, may save nine bushels of fruit later. Split trees and dangerous crotches need attention. Bolts are cheap. Use 'em.

Winter and early spring afford excellent chances to find and destroy all cocoons, egg clusters, etc., on fruit trees. Make a practise of doing this each year. It pays.

Be careful not to let the cover crop grow so late in the spring that it pulls all the moisture out of the soil. Rye, etc., should be plowed under *before* it becomes tall and woody.

Cows, sheep, etc., have no good excuse for being in an orchard at any time. There's always danger that they will bark the trees,—especially when green forage is absent.

When fall comes, be sure to clean up all trash in the orchard. Mow the weeds (there shouldn't be any). Burn all rubbish. Then the owls, hawks, cats and crows can readily see and catch all field mice.

Trees which have been completely girdled by mice or rabbits, can often be saved by means of bridge grafting. (See Chapter II.) Partially-girdled trees should be bandaged with cow manure and burlap.

An experienced orchardist says that it is an excellent plan to leave the clippings under the trees in the winter when pruning an orchard, so that mice and rabbits will eat such tender twigs instead of gnawing at the tree trunk itself.

Dormant buds: Sometimes every fruit bud or blossom on a tree will seem to be killed by cold, and yet—to most folks' surprise—a moderate crop of fruit results. How? By means of the dormant (undeveloped) buds on the trees. When normal buds are killed, the trees often force forward the dormant ones in time partially to supply the deficiency.

Good drainage in the orchard is essential to success. Like human beings, fruit trees can not stand wet feet. In the fall a furrow-ditch plowed between tree rows, or wherever needed, may help to insure better drainage conditions during the winter and early spring. See that tile drain outlets do not become obstructed; to keep out small animals, fasten wire netting over each outlet.

Fruit buds: These are apt to be more plump than leaf buds, and are therefore usually easily recognized. Slice a fruit bud through the centre, lengthwise; if it is alive, the interior is greenish-yellowish in appearance; if dead, the *heart is blackened*, even though the remainder of interior looks all right. Frozen buds should be thawed out for several days before making this test.

Severe pruning-back is the most effective treatment for badly frozen very young peach trees, etc. Moderate cutting-back is best for less seriously affected young trees, and also for badly injured old peach trees, etc. Citrus trees, etc., will often sprout again from a mere stump. Give all frozen trees a fair chance; never pull out a tree until it has had an opportunity to recover. Nature sometimes performs wonders in this line in one or two seasons.

Farmers who have been putting axle grease on their trees to protect them from rabbits, sheep and vermin, should not do so. It is not a good plan. The sun shining on the greasy bark drives the grease into the tree and may kill it. The best thing to use is beef blood, such as is easily obtained in any slaughter house; then mix it thoroughly with clay and wood ashes. The ashes act as a germicide, while the clay forms a paste which prevents the blood being readily washed off by the rains.

Blossom knowledge: 1. Scarcely one fruit blossom in ten sets fruit, even in the most favorable seasons and with the most productive varieties. 2. Trees making a very vigorous growth may drop their blossoms. 3. Brown rot, apple or pear scab, and pear blight may kill the blossoms. 4. Frost injury to blossoms is of all degrees. Even flowers which appear to be uninjured may be so weakened that they can not set fruit. 5. Rain during the blooming season prevents the setting of fruit, chiefly by destroying the vitality of the pollen, injuring the stigma, or by preventing fertilization because of the low temperature. The washing of pollen from the anthers seldom causes serious loss. 6. If a tree stands alone and does not bear fruit, it may be self-sterile.

Sun-scald is usually caused by alternate freezing and thawing, which eventually bursts the bark on the southward side of the tree trunk near the ground. Sometimes, however, it is caused by the sun striking too hot in summer on exposed branches or trunk. It is a serious trouble in some orchards and with some varieties, and the only sure remedy is to shade the trunk in some manner. Wrappings of wood veneer or laths answer the purpose, generally speaking. Besides, such wrappings fence out mice and rabbits. I earnestly advise my brother orchardists to avail themselves of this double protection. Wood-veneer tree protectors may be purchased for about \$5 per 1000, and will last several years. Protection against sun-scald and rabbit injury is especially necessary for young trees.

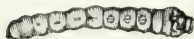


VENEER
TREE
PROTECTOR

Abel F. Stevens says:—"Spring frosts have caused an immense amount of damage. We have been very successful in combating the baneful effects of killing frosts by the following method: Mix coal-tar with sawdust and old straw, and place in heaps on the windward side. When heavy frosts threaten, set these heaps afire. They will burn for many hours, making a dense smoke which completely protects blossoms or fruit." An excellent idea, surely. In this connection I would say that some western orchardists are using an electric automatic alarm thermometer, to give warning at night when frost damage threatens. This saves the owner the trouble of sitting up nights. The thermometer is fastened to a post in the orchard, and wires run from it to an alarm bell in the house bedroom. If the cold reaches the danger point, the bell rings, and the fruit-grower can then hasten out and light his smudges. Let me say, further, that sprinkling or irrigating an orchard when frost threatens, is often an excellent preventive of frost injury.

Beware of borers: Various kinds of borers—fat, whitish worms—attack the different varieties of fruit trees; there are the apple-tree borers, the peach-tree borers, etc., etc. It will be wise to begin looking for signs of these pests the fall or spring

following the setting of the trees, and, during the life of the trees, this annual inspection should be continued. Carry a sharp, small-bladed knife, a piece of stout, flexible wire, and a trowel or spade. Examine each trunk near the ground for traces of "sawdust" or "gum" (the last, of course, will be found only on trees like the peach and cherry). Either or both of these signs, when found, show that one or more borers probably lurk within. So, down you go on your knees; the soil is pulled away from the trunk to a depth of several inches—and the war is on! With



BORER

knife and wire the borers' burrows are probed until the enemy is found and killed. Then on to the next tree. A few careful cuts in the bark do the tree far less injury than the damage an unmolested borer will do. So don't be afraid. (Note: Some species of borers—notably the flat-headed apple-tree borer and the plum-tree borer—often attack the upper part of the trunk, and even the lower portions of the main limbs. The peach-tree borer and the round-headed apple-tree borer usually attack the trunk at a point close to the ground.) Among preventive measures are several methods which are sometimes successfully used to keep borers out of the trees: Mound up the earth to a height of a foot or more around each tree, in May, and then allow the earth to remain until September. Or, protect the lower part of each trunk (during the same period of time) with closely-wrapped building paper. This paper should extend an inch or so below the ground surface, and about two feet above it, and be securely tied in place. Or try this wash: Dissolve one pound of hard soap in two gallons of boiling water; then add one pint of crude carbolic acid, an ounce of Paris green, and enough lime to make a thin paste; apply with a brush to trunks and larger branches of trees; if bark is rough, scrape trunks before applying wash. Professor Surface says that the ordinary lime sulphur mixture, sprayed or brushed on the trunks, is an excellent preventive of borer, mice and rabbit injury.

Spring frosts of various kinds are most successfully fought by the use of about 100 oil-burning metal pots evenly distributed on each acre. Coal-burning metal baskets are preferred by some orchardists. Several excellent forms of both devices are now on the market, and the expense of a satisfactory outfit is not prohibitive. I believe that these heaters will come into use more and more by up-to-date fruit-growers everywhere. For further information on this subject, write to your State Experiment Station.



PLATE IV



A DISH OF SNOW APPLES,— WITH HARRIET'S COMPLIMENTS

CHAPTER X.

THE APPLE.

If there's a better fruit than an apple it's another apple.—Tim.

This splendid fruit is almost as “old as the hills.” King Solomon appreciated good apples. And charred remains of apples have been found in prehistoric dwellings in Europe. Southwestern Asia is where this fruit originated. Harriet says that it is the “best job that Asia ever did,” and I agree with her.

PROPAGATION.—Apples can be propagated either by grafting or budding, the former method being most commonly used by nurserymen. Whip grafts on seedling roots are often employed. But there are several ways of obtaining good trees for setting. My friend, Wilmer Atkinson, says: “If I were to plant another apple orchard, I should buy Northern Spy nursery trees, set them, and cut off and cleft-graft (after the tree is set) each trunk at the point where the first branches are wanted,—using scions cut from thrifty bearing trees of *known variety and productiveness*.” To Mr. Atkinson's excellent plan I might add that if a man has time, and can't afford to buy the trees, he might grow Spy seedling trees and then graft them—thus saving the nursery bill.

SELECTING NURSERY TREES.—Two-year-old, straight, medium-size, healthy trees are about right. See that they are not branched too high; three or four feet should be the limit.

SOILS.—Almost any soil will do for the apple orchard, provided that it be somewhat elevated and



MAY'S PROMISE

sufficiently well drained. Very light sand, or swampy muck, would be least desirable; a loamy clay soil, most desirable.

VARIETIES WHICH ARE OFTEN SELF-STERILE.—

"Bellflower, Primate, Spitzenburg, Willow Twig, Winesap," says Cornell Experiment Station. Some other varieties might be added to this list. In fact, the only safe way is to mix the planting, and to include some of the more self-fertile-blossom kinds,—such as "Baldwin, Ben Davis, Fallawater, Jannet, Oldenburg, Rhode Island Greening, Astrachan, Smith's Cider," etc. (And even some of these are self-sterile in some localities and under some circumstances! So I again say, "Mix.")



AUTUMN'S FULFILLMENT

PRUNING.—Apple trees should be cut back (so as not to grow too high), thinned out (so as to let sunshine and air into the head), and trimmed up (to permit of necessary horse cultivation). For general pruning directions, see Chapter V. Moderate, regular trimming is preferable to heavy,

irregular trimming. The apple produces its fruit on twigs or fruit spurs which are at least three or four years old.

PRINCIPAL INSECT PESTS. — Aphis (lice) on leaves. Remedy: Spray with tobacco solution when lice first hatch out and before they are hidden by curl of leaves.

Apple maggot: A tiny worm which tunnels the fruit in all directions. Remedy: Promptly pick up and destroy or feed to the stock all windfalls.

Apple-twig borer: A tiny blackish beetle which bores into terminal twigs near buds. Infested twigs often wilt and die. No good remedy is known, except to cut off all such twigs, not later than July, and burn them.

Borers: Two kinds—"round-headed" and "flat-headed." See Chapter IX for borer remedies.

Bud worm: A little caterpillar that attacks buds, blossoms and starting leaves. Remedy: Arsenical spray when buds begin to open.

Buffalo tree-hopper: A small greenish insect about one-third of an inch long, that punctures the twigs, causing a peculiar scarred appearance. Remedy: Cut off the injured twigs and burn.

Codling moth: 'Tis estimated that one-half of America's apple crop is annually ruined by the codling moth. This is the pest that causes "wormy apple-cores." The moth seldom flies except at night, and therefore few fruit-growers have ever seen one. About the time that the blossoms are falling, this moth appears and glues its eggs on or near the miniature apples. In about a week these eggs hatch,

and, as a rule, each little apple worm soon finds its way directly into the upright, open, cup-like blossom end on top of an apple. Here it hides and feeds for several days—then it bores its way into the apple to the core. The time to fight this pest is *when it is feeding on the outside of the apple, in the little cup-like cradle*. A drop or two of poison then applied will quickly kill the worm and thus save the apple; whereas if the fight is delayed until it has really entered the apple, no outward application of poison



"BEGIN
SPRAYING"

can affect it. *"The falling of the blossoms is the signal to begin spraying; the closing of the calyx lobes a week or two later is the signal to stop spraying."* The Bordeaux-arsenical spray is excellent for this



"STOP SPRAYING"

purpose. Two applications—a week apart—are advised. Banding the trees, and promptly destroying all windfall apples, are measures which are also of help.

Canker worm: This "looping" or "measuring" caterpillar feeds upon the foliage and is often very destructive. Remedies: Sticky bands of tar, printers' ink, or fly-paper, placed around each tree trunk in early spring to prevent the ascent of the egg-laying moths; an arsenical spray all over trees where worms have hatched.

Curculio: A hump-backed beetle about an eighth of an inch long (related to the plum curculio, but with a longer snout) which sometimes stings young apples. Remedy: Arsenical spray.

Leaf roller, leaf crumpler, and leaf skeletonizer: These three pests can be killed with an arsenical spray.

Scale lice: San Jose, oyster-shell, and scurfy. See Chapter VIII for remedies.

Tent-caterpillar: The well-known "nest" worm found on trees in early summer. Remedies: Tie a piece of cloth around one end of a long stick, saturate the cloth with kerosene, ignite, and with this torch quickly burn each silky tent of worms; do this in early morning or just before nightfall, so as to be sure that all the worms are "at home"; an arsenical spray is also helpful.

Woolly aphis: There are two forms of this insect; one attacks the roots, as told in Chapter III; the other occurs in masses of white, woolly substance on the limbs and trunks. Beneath each woolly mass will be found a number of yellowish lice. Remedies: Kerosene emulsion, tobacco solution, or scalding hot water.

PRINCIPAL FUNGOUS PESTS.—Powdery mildew: Whitish blotches sometimes found, about midsummer, on terminal shoots and leaves, which soon spread over most of the new growth. Remedy: Bordeaux mixture.

Rot: This trouble is also called "bitter rot," "ripe rot," "apple rot," etc.; it attacks the fruit before the ripening period, causing decayed brown spots; usually the infected specimens drop to the ground, although some of them shrivel up and stay on the tree all winter, thus carrying the fungous spores to the next year's crop. Remedies: Destroy fallen fruit; remove

and burn all mummied apples which stay on the trees in the fall; spray with the Bordeaux mixture early in the season. (Note: There is another form of rot which is called "pink rot." Bordeaux is the remedy.)

Rust: A fungus which sometimes blisters the leaves with orange-colored spots, and which usually originates on cedar trees. Remedies: Spray or cut down any cedars which may be near the apple orchard; spray the orchard with Bordeaux.

Scab: This is sometimes called "black spot"; it produces the well-known scabby places upon apples; it also affects the new shoots and leaves, causing black blotches thereon,—and often the early spring leaves are thus blighted; young apples shrivel and drop from the tree; mature apples are seriously disfigured. Remedy: Bordeaux, several sprayings at intervals of about two weeks, beginning before buds open.

Twig blight: This apple disease is similar in nature to the well-known "fire blight" of the pear; affected terminal twigs (including leaves, flowers or fruit thereon) turn black or brown, and die. The only known remedy is to cut out the diseased parts, and burn. (See pear blight, Chapter XIII.) This trouble comes and goes, and is worse some years than others.

MISCELLANEOUS TROUBLES.—Chief among these are sun-scald (consult Chapter IX), crown galls (Chapter III), canker and collar rot. No very good remedies are known for the two last-mentioned troubles; they seem to be closely related to "twig" and "fire" blight; for instance, a blighted twig will often cause a canker to form near its base.

Canker is a fungous or bacterial trouble which causes cracked or sunken irregular dead places to appear on the bark or limbs, in crotches, and sometimes in such form as practically to girdle small branches. Cut out and burn such small branches. If large cankers appear on trunk or main limbs, cut out the diseased places with a sharp knife, swab out and disinfect the wounds with corrosive sublimate solution (one tablet dissolved in one pint of water), and, when dry, cover the places with thick lead-and-oil paint. Do this early in the season. Renew the paint each year until wounds heal. Disinfect knife after such use. Remember that corrosive sublimate is poison.

Collar rot most often attacks King and Spitzenburg trees, and diseased trees should be treated as advised for canker. (Note: Top-grafting these varieties on, say, Spy stocks, would secure new trees less liable to this disease of the bark at the base of the trunk.)

A WISE "COMBINATION" SPRAYING SYSTEM.—The up-to-date grower does not often consider each insect and fungous pest separately. No. He plans a spraying campaign which pretty nearly hits them all (except borers, aphids, etc.). Here is a good system: First spraying, Bordeaux, in spring *before* leaf buds open; second spraying (if bud worms, canker worms or curculios are abundant), Bordeaux-arsenical mixture, just *before* blossoms open; third spraying, Bordeaux-arsenical mixture immediately *after* blossoms fall; fourth, repeat same mixture at end of one week; Bordeaux alone, two weeks later, may make

the fifth application. (Note: Often, only the first, third and fourth sprayings are necessary. If strong lime-sulphur spray is used in February or March for San Jose, *the first application of Bordeaux may be omitted*. If desired, the later Bordeaux sprays may be replaced by the mild or self-boiled lime-sulphur mixtures.)

APPLE BY-PRODUCTS.—The poorer grades of apples can often be advantageously utilized in the making of jelly, marmalade, dried apples, and vinegar. With a hand press about two gallons of cider can be extracted from a bushel of average apples; with a power press it is possible to extract almost twice as much. Barrels for cider vinegar should be thoroughly cleaned and scalded out. Fermentation is usually completed in from three to six weeks, at which time add a small quantity of mother of vinegar to hasten the vinegar process. Admit air freely to the barrels, keep them in the warmest part of the cellar, and in less than a year you should have a supply of excellent vinegar.

REINVIGORATING AN OLD, NEGLECTED ORCHARD.—Circumstances may alter cases, but in a general way I suggest the following plan: First, prune as directed for neglected trees (Chapter V); then commence the "combination spraying system" recommended in this chapter; look out for borers, sun-scald, scale lice, etc.; scrape loose bark off from trunk and main limbs, and apply whitewash thereto (if the lime-sulphur spray is used, whitewash will not be needed); plug up or paint all old wounds, first sawing off all old stubs (grafting wax makes a good plug for cavities); plow the orchard in spring—as shallow as possible; never mind if you do cut a few roots; apply



fertilizers, and cultivate, regularly, as told in Chapter VI; sow cover crops as directed in Chapter IX; continue to prune, spray, plow, fertilize, cultivate, etc., each following year.

VARIETIES.—Those marked with a star are especially suited for commercial orchards and market.

L. B. Judson, Idaho, says that Jonathan, Rome Beauty and Ben Davis are the greatest favorites, the state over, for commercial plantations.

J. C. Whitten, Missouri, pins his faith to these commercial kinds: Ben Davis, Gano, Jonathan, York Imperial, Missouri Pippin, Winesap, Grimes' Golden, Clayton, Ingram and Rome Beauty.

W. T. Vincenheller, Arkansas, writes: For a list of market apples that I would plant in an orchard of 1,000 trees, I beg to state that I would use Black Ben Davis, Jonathan, Grimes' Golden and King David, in equal quantities.

Farm Journal's "best twelve" list of market varieties from which to select for a commercial orchard located in Pennsylvania, etc., comprises: Hays, Maiden's Blush, Rambo, York Imperial, Rome Beauty, Stayman Winesap, Baldwin, R. I. Greening, Grimes' Golden, Sutton Beauty, Smokehouse, Smith's Cider.

Dr. Chamberlain's favorite list of market varieties for Ohio, is as follows: "For summer, Red Astrachan, Oldenburg; for early fall, Maiden's Blush; for late fall and winter, Baldwin, R. I. Greening, Seek-no-further, Peck's Pleasant (short-lived tree but fine dessert apple), Northern Spy, Roxbury Russet, Jonathan, Belmont, Canada Red. I would have at least ninety per cent. Baldwins."

For the cold districts of Maine, northern Vermont, northern New Hampshire, northeastern New York, Quebec, New Brunswick, etc., and the northern peninsula of Michigan, the following varieties are suggested by the government pomologist:

Tetofsky; *Oldenburg; *Gravenstein; Wealthy; St. Lawrence; Twenty Ounce; *Fameuse; Pewaukee; Bailey Sweet; McIntosh; Wolf River; Tolman Sweet; *Northern Spy.

For Colorado, etc., the following varieties are suggested:

Tetofsky; *Red Astrachan; *Oldenburg; *Maiden's Blush; Bailey Sweet; *Jonathan; Pewaukee; Swaar; Fallwater; Hubbardston; White Pearmain; Yellow Bellflower; Golden Russet; Peck's Pleasant; *Winesap; Yellow Transparent; Early Harvest; Red June; Gravenstein; Wealthy; Wolf River; *Grimes' Golden; Northern Spy; Tolman Sweet; *Missouri; *Tompkins King; Red Canada; Rhode Island Greening; *Rome Beauty; Wagener; White Pippin; Rall's Jannet.

For Delaware, southern New Jersey, Maryland, Virginia, West Virginia, southern Ohio, southern Indiana, Kentucky, Tennessee, and North Carolina, the following varieties are suggested:

Yellow Transparent; Trenton Early; *Oldenburg; Primate; Red June; Golden Sweet; Early Strawberry; Fall Pippin; Jefferis; Rambo; *Gravenstein; Wealthy; *Jonathan; *Northern Spy; Esopus; Blue Pearmain; *Ben Davis; Rall's Jannet; Early Harvest; Porter; St. Lawrence; Shiawassee; Melon; *Grimes' Golden; Newtown Spitzenburg; Fallwater; *White Pippin; Arkansas (Mammoth Blacktwig); *Stark; *York Imperial; *Stayman Winesap; *Yellow Newtown.

For northern Illinois, Wisconsin, Minnesota, Iowa, and Nebraska, the following varieties are suggested:

Tetofsky; Red Astrachan; *Oldenburg; Red Stripe; Golden Sweet; *Benoni; Charlamoff; Borovinka; Porter; *Maiden's Blush; Alexander; Dyer; Rambo; Lowell; Shiawassee; Yellow Transparent; Early Harvest; Primate; Jefferis; Gravenstein; Fall Pippin; St. Lawrence; Wolf River; *Wealthy; Fameuse; McIntosh; Ladies' Sweet; *Grimes' Golden; Westfield; Newtown Spitzenburg; Esopus; Domine; Roman Stem; *White Pippin; Rome Beauty; *Stark; Rall's Jannet; *Willow; *Jonathan; *Hubbardston; Wagener; Red Canada; Tolman; English Russet; N. W. Greening; *Winesap; *York Imperial.

For New York, Massachusetts, Connecticut, southern Vermont, southern New Hampshire, northern New Jersey, Pennsylvania, northern Indiana, northern Ohio, and the lower peninsula of Michigan, the following varieties are suggested:

Early Harvest; *Oldenburg; Golden Sweet; Red Stripe; Sweet Bough; Early Strawberry; *Maiden's Blush; Red Astrachan; Benoni; *Rambo; Gravenstein; *Fameuse; St. Lawrence; Jefferis; Bailey Sweet; Wagener; *Northern Spy; Esopus; *Rome Beauty; *Baldwin; *Ben Davis; *Rhode Island Greening; Winesap; *York Imperial; Fall Pippin; Shiawassee; Jersey Sweet; Wealthy; *Grimes' Golden; Smokehouse; *Sutton Beauty; *Smith's Cider; Westfield; Newtown Spitzenburg; Red Canada; *Tompkins King; Hubbardston; Roxbury; *Stark.



JOLLY GOOD FELLOWS



PLATE XI

MONTMORENCY



BLACK TARTARIAN
(IN MIDDLE)

NAPOLEON

CHAPTER XI.

THE CHERRY.

Plant enough cherries for both folks and birds.—Farmer Vincent.

This delicious fruit came originally from Europe, and comprises two distinct species—sour cherries and sweet cherries.

PROPAGATION. — Budding is the usual method. Common seedlings may be used for stocks, although nurserymen commonly use imported stocks such as the Mahaleb or the Mazzard. For very cold climates the Mahaleb stock proves more hardy.

SELECTING NURSERY TREES. — Cherries one or two years old from the bud, are about right. Choose medium-size trees. If you can get unbranched sweet cherries, they are somewhat easier to make live.

SOILS. — Cherry trees do best in a light soil, well drained, but not too dry ; sandy, loamy or gravelly.

SPECIAL CULTIVATION RULES. — Owing to the fact that the cherry matures its fruit so early in the season, cultivation should begin earlier and cease sooner than in the case of other tree fruits.

Bark-burst, sun-scald, gum : Cherries (especially sweet varieties), often grow so rapidly as to burst the bark at some point or points on the trunk. Therefore, excessive pruning, cultivation or nitrogenous fertilizers should be discouraged. In fact, many growers say that cultivation should cease two or three years after planting, and the ground be seeded

down permanently. This, of course, depends somewhat on climate, variety, and soil. In regard to sun-scald injury and preventive measures, consult Chapter IX; for gum, see Chapter XII.

VARIETIES WHICH ARE OFTEN SELF-STERILE.—S. W. Fletcher places three varieties in this list: Napoleon, Belle de Choisy, and Reine Hortense.

PRUNING.—The less cherry trees are pruned the better. Of course, it is necessary to cut back a tree at time of planting, and to guide it in the right path for the first two or three years. The fruit of the cherry is produced only on wood which is two or three years old.

PRINCIPAL INSECT PESTS.—Aphis (lice): Attack the leaves on ends of tender young shoots. Remedy: Tobacco solution, applied early, before leaves curl.

Borers: The flat-headed cherry-tree borer is very much like the flat-headed apple-tree borer.

Curculio: The plum curculio often stings cherries, too, but the injured cherries are not so apt to drop off.

Cherry fruit-fly or maggot: A fly which punctures the skin of the fruit, and deposits an egg which soon hatches into a small worm or maggot. The curculio makes a crescent-shaped puncture; this fly does not. Prof. Slingerland says: "Place a temporary wire netting around the trees and turn hens therein soon after the fruit is picked."

Leaf rollers: These pests feed on the leaves and roll them together for protection. Remedies: Arsenical sprays; cut off and burn badly infested twigs.

May beetle : This well-known "June bug" sometimes attacks the foliage at night. Arsenical sprays.

Rose bug : See Chapter XII.

Slug : The ordinary pear-tree slug often feeds on the leaves of cherry trees.

San Jose scale louse : Consult Chapter VIII.

PRINCIPAL FUNGOUS PESTS.—Black knot : Dark, knotty, wart-like bunches upon twigs and branches. Easily seen and recognized. Spreads if not promptly attended to. Remedy : Cut out and burn all knots as soon as seen ; cut well below the diseased parts (also, spray the trees with Bordeaux).

Brown rot : It causes decayed brownish places on the fruit, quickly ruining it and rapidly spreading to adjacent cherries ; infected specimens may drop to the ground, or they may shrivel up and stay on the tree all winter, thus carrying the disease to next year's crop. Remedies : Destroy fallen fruit ; remove and burn all mummied cherries found on the trees in the fall ; spray with Bordeaux, several times, early in the season ; pick the fruit promptly and early.

Leaf-blight or spot : Often called the "shot-hole fungus." Makes round spots on the leaves, which soon drop off. Remedy : Two or three early sprayings with Bordeaux.

Powdery mildew : See Chapter X.

COMPLETE SPRAYING SYSTEM.—Properly and easily to treat most insects (except lice, borers, etc.), and all fungous pests, I suggest the following combined method : Just before buds open, apply Bordeaux-arsenical mixture ; give second spraying when fruit has set, using same mixture ; two weeks later,

Bordeaux. (Special note: If the trees receive a lime-sulphur treatment for San Jose in early spring, the first Bordeaux application may be omitted. If desired, the later Bordeaux sprays may be replaced by the mild or self-boiled lime-sulphur.)

BIRD INJURY.—I wish that I were able to suggest a really satisfactory way to prevent birds from getting more than their share of cherries. The only practicable remedies seem to be: Either put mosquito netting over a few trees, or plant enough trees for birds, market and family. One or two mulberry trees help to attract birds away from the cherries.

VARIETIES.—Those marked with a star are especially suited for market.

H. L. Price, for Virginia, recommends: Coe's Transparent; Early Purple; Windsor; Reine Hortense; *Montmorency; Olivet.

J. L. Herbst, Sparta, Wisconsin, recommends just one variety—Early Richmond—as being profitable to plant in that cold climate.

My friend Wilmer Atkinson's favorite list for Pennsylvania, and similar climates, is as follows: *Black Tartarian; *Windsor; Gov. Wood; Downer's Late; Early Richmond; *Montmorency.

Edward J. Wickson recommends for California, the following varieties: *Early Purple Guigue; *Napoleon (often called "Royal Ann"); *Lewelling; *Black Tartarian; *California Advance; *Bing.

Benton Gebhart, a successful Michigan grower, says that he has had best results with the following: *Early Richmond; *Montmorency; *English Morello; *Brusseller Braune; sweet varieties—*Gov. Wood; *Black Tartarian; *Windsor.

G. H. Powell and L. H. Bailey, New York State (where there are many commercial cherry orchards), recommend these varieties: Louis Phillipe; *Montmorency; *English Morello; *Windsor; *Napoleon; *Black Tartarian; *Black Eagle; *Mezel; *Robert's Red Heart; *Downer's Late Red; Gov. Wood; Coe's Transparent; Belle d'Orleans; Rockport; Knight's Early Black; Yellow Spanish; May Duke.



SALWAY

MOUNTAIN ROSE

CHAPTER XII.

THE PEACH.

A farm without some peach trees is like milk without cream.—Tim.

The peach is not a native of America. Probably the peach originated in China; from thence it went to Persia and to Europe.

PROPAGATION. — Bud known varieties on to seedling peach stocks, close to the ground. A thrifty tree one year from the bud is the right size to set. When buying trees, choose medium size, straight ones; let the big, overgrown fellows alone. (Note: Plums are sometimes used for stocks, if the peach orchard must be planted on rather heavy, damp soil.)



FOUR HALF-POUND BEAUTIES

VARIETIES WHICH ARE OFTEN SELF-STERILE. — Under this heading S. W. Fletcher lists only one kind of peach, viz.—the Susquehanna.

PRUNING.—Of all fruit trees the peach seems to need the most trimming (the dwarf pear is a close second in this respect). Each season the trees should be pruned—cutting them back and thinning them out, both. Cutting off one-half or two-thirds of the new growth each year, is not too much. Remember that the peach (unlike the

apple, cherry, plum, and pear) produces its fruit on wood of the preceding year,—that is, on one-year-old wood.

SPECIAL CULTIVATION HINTS.—The peach, to be healthy and profitable, *must* be cultivated. In this it is unlike the pear, cherry, etc.,—which sometimes do fairly well in sod. Experienced peach growers do not, as a rule, plow a bearing peach orchard until *after* it has blossomed. Why not? For the same reason that they often choose a north slope—to retard, so far as is possible, the blossoming period with its liability to early frost injury. Remember that no tree will die so quickly from “wet feet” as will the peach (unless it is the cherry).

PRINCIPAL INSECT PESTS.—Aphis (lice): See preceding chapter.

Borers: The peach-tree borer is the most common pest in this line, although the flat-headed borers of the apple and cherry sometimes (not often) attack the peach. For remedies, see Chapter IX.

Curculio: The plum curculio often stings peaches.

Fruit-bark beetle: A small black beetle which bores tiny holes into the bark of upper twigs and limbs, and then forms inner-bark burrows. This causes some of the infested branches to wither and die. Remedies: This beetle is most apt to attack unthrifty trees; therefore, good cultivation, fertilization, pruning, etc., are helpful. Promptly burn all cuttings, so that the larvæ within may be destroyed. Early sprayings with the Bordeaux-arsenical mixture. This insect is sometimes called the “pin borer.”

San Jose scale louse: Consult Chapter VIII.

The snowy tree cricket sometimes punctures new wood; cut off and burn such wood. Rose chafers or bugs occasionally attack fruit, etc. Knock them into pans of kerosene.

PRINCIPAL FUNGOUS PESTS.—Brown rot: See preceding chapter for description and remedies. Besides affecting the fruit (and sometimes the blossoms), this fungus often injures or kills the twigs, as well. The result is something like “twig blight,” although the cause is different from the true twig blight of the apple, pear, etc. Thinning the fruit helps to prevent the spread of the rot.

Leaf-curl: This is, some seasons, a very serious trouble in many peach orchards. Shortly after the leaves come out in the spring they begin to curl, soon become distorted and misshapen, and then fall off. Thus the tree becomes partially or wholly denuded of foliage, the immature fruit is likely to drop off, and the vitality of the tree is, of course, more or less injured in the attempt to perfect a second and



PEACH LEAF-CURL

later crop of leaves. Some varieties seem more subject to this trouble than others; and the disease is apt to be worse in a wet season. Remedy: Full-strength Bordeaux (or lime-sulphur spray) in spring *before buds swell*; when blossoms have fallen, spray with half-strength Bordeaux; if necessary, repeat with half-strength Bordeaux two weeks later.

Scab : Somewhat similar to apple scab. Bordeaux.

MISCELLANEOUS TROUBLES.—Crown Gall : See Chapter III.

Gum : Caused by borers, bruises, and fungus. Common on peach, cherry and plum trees.

“Little Peach” : Very little is known of this disease, and it is as yet common in only a few localities. The name is quite expressive of the symptoms ; the fruit remains small and tough, the tree seems unhealthy, the leaves seem smaller than is natural, and finally the tree dies. The disease spreads from one tree to another. The only known remedy is to pull out the infected trees at once, and burn them.

Peach “rosette” is a disease of the peach in the southern states. Its effects on the tree are similar to those of yellows, and, like that disease, it is to be controlled only by the destruction of affected trees.

Sun-scald : Consult Chapter IX. Some folks call this trouble “frost-crack” when it occurs during freezing weather.

“Sun-scorch” of foliage sometimes occurs during a drouth, or when hot, dry winds blow. Regular cultivation is a partial preventive of sun-scorch.

“Yellows” : This is probably the most serious foe that the peach grower has to contend with, —unless it be the San Jose scale louse. It is a communicable disease ; it is always fatal within a few years ; and it attacks both old and young trees, and seemingly has an especial fondness for healthy, vigorous trees. No cure is known, and the exact nature of the disease has not yet been determined. In bearing trees the premature ripening of the fruit is one of the first

indications of the presence of "yellows," says B. O. Longyear. Such fruits are also highly colored, possessing red spots and streaks which often extend from the surface to the pit, the flesh being marbled and streaked with red. The buds formed during the summer, for growth the next season, are also sometimes prematurely unfolded. But the most characteristic feature is the growth of bunches of slender, twiggy branches during the summer and autumn, from the crotches and upon the older branches. These wiry shoots bear narrow sickly leaves of a yellow color, and, being produced in clusters, give a characteristic appearance to infected trees. "Yellows" laws, requiring the prompt destruction and burning of infected trees, are strictly enforced in most peach localities, and in this way the disease has, of late years, been successfully held in check.



CASE OF "YELLOWS"

COMPLETE SPRAYING SYSTEM.—A combination system for fungi and most insects would be about as follows: First spray, full-strength Bordeaux-arsenical mixture just before buds swell; second spray, after blossoms fall and fruit has set, half-strength Bordeaux and arsenate of lead; third spray, half-strength Bordeaux-arsenate when fruit is half grown; if rot threatens fruit, repeat half-strength Bordeaux spray, one or more times, at intervals of about ten days or two weeks. (Special note: If the trees receive a

lime-sulphur treatment for San Jose in early spring, the first Bordeaux application will not be needed. If desired, the later Bordeaux sprays may be replaced—many growers say with advantage—by the self-boiled lime-sulphur mixture.)

VARIETIES.—Those marked with a star are especially suited for market.

K. B. Wilkerson, a prominent Missouri grower, gives this list: Amsden; Heath Cling; Crawford's Early; *Crawford's Late; Stump; *Crosby; *Champion; *Elberta; *Wonderful; Triumph.

Wilmer Atkinson's favorite list is: Mountain Rose; Champion; *Moore's Favorite; *Reeve's Favorite; *Stump the World; *Elberta; *Crawford's Late; Ward's Late; Chair's Choice; Globe; *Smock Free.

George T. Powell, for a commercial orchard in New York, would plant: Champion; Carman; Belle of Georgia; Oldmixon Free; Stump; Fox Seedling. The list might need modifying somewhat, according to the location in the state.

For very cold climates, Hill's Chili, Champion and Crosby are perhaps the most hardy variety. But the only sure way of growing a family supply of peaches in such localities, is to "lay down" the trees each fall, and cover them over with earth, leaves, straw, or other protection. Such trees should be trained flat-shaped. Cut the roots on one side; then pull the tree to the ground and stake it there. In the spring, right it; put the earth back in place; fertilize, cultivate, etc.

J. N. Stearns, a prominent western Michigan grower, writes:—If I were to plant another commercial peach orchard of, say, 1,000 trees, I should set 250 Kalamazoo, 250 Golden Drop, 250 Smock and 250 Salway. These sorts have brought me more money, for the last twenty-five years, than any others. Elberta is too unreliable. Golden Drop should be severely pruned and thinned. (Please note that this successful peach grower includes no white-flesh varieties in his list. Many markets and buyers prefer yellow-flesh peaches.—J. B.)

J. H. Hale, the famous peach grower who has enormous orchards in Connecticut and Georgia, writes that his favorite list for a succession from early to late in Connecticut, is as follows: *Greensboro; *Waddell; *Carman; *Hiley; *Champion; *Belle of Georgia; *Elberta; *Chair's Choice; *Steven's. Cut out Chair's Choice and Steven's, and the list is a "cream one" for Georgia, adds Mr. Hale in his letter. (The peach crop must be gathered promptly when ripe, or loss results; therefore, in large orchards, planting varieties which ripen in succession through a long season is highly desirable and essential.—J. B.)

PLATE XIII
SHELDON



BARTLETT
(IN MIDDLE)

SECKEL

CHAPTER XIII.

THE PEAR.

There's money in pears for the man who knows how to get it out.

Ever since this country was first settled, pears from European stock have been grown here. They thrive especially well in the eastern, central and far western states, and less well in the southern and prairie states. Wherever the climate is very cold or



A FORTY-ACRE PEAR ORCHARD

very hot, there commercial pear culture becomes uncertain or unsatisfactory.

PROPAGATION. — Standard pears are budded or grafted on seedling pear stocks, at a point near the crown. Nurserymen usually import seedling pear stocks from France, but it is not difficult to grow

seedlings for one's own use. When buying nursery trees for setting, choose medium-size, straight, low-headed, two-year-olds.

SOILS.—The ideal pear soil is a rather heavy clay-loam, with a well-drained subsoil. Heavy clay does very well if the underdrainage is sufficient. Light or sandy soils are not so good for this fruit.

VARIETIES WHICH ARE OFTEN SELF-STERILE.—S. W. Fletcher, of the Cornell, N. Y., Experiment Station, gives this list: "Duchess; Bartlett; Clapp; Idaho; Kieffer; Nelis." (Moral: Don't set solid, large blocks of any one of these varieties,—nor of any other kind.)

PRUNING.—Cut back and thin out, moderately, each season. Always cut back to a bud or a branch, so as not to leave a stub. Pruning tools which are used on blighted trees, should be disinfected before being used again. The pear produces its fruit on fruit spurs or wood several years old.

SPECIAL CULTURAL DIRECTIONS.—Too much cultivation is often dangerous to pear trees (see fire-blight). After a new orchard has made a good growth for several years, it is often advisable to seed down the land (permanently or temporarily), so as to stop excessive wood growth. Likewise, it is usually prudent to stop cultivation earlier in the season than is customary with other trees (this plan—with an early-sown cover-crop—will often do away with the necessity of seeding down the orchard). The same caution extends to fertilizers. Too much nitrogen means too much wood growth; therefore use more potash and phosphoric acid, and less stable manure.

The safest source of nitrogen supply is from occasional nitrogenous cover crops.

SUN-SCALD.—See Chapter IX.

PRINCIPAL INSECT PESTS.—Borers: The true pear-tree borer is something like the peach-tree borer, only smaller and seldom so troublesomely numerous. The round-headed and flat-headed apple-tree borers also attack pear trees sometimes. See Chapter IX.

Codling moth: Often attacks pears as well as apples. Consult Chapter X for description and remedies.

Midge: A small, grayish, long-legged fly which early in spring deposits its eggs inside the pear blossoms. The eggs rapidly hatch into tiny worms which enter the baby fruits and feed upon them, causing them to stop growing or to become misshapen. During the summer these worms leave the fruit, fall to the ground, enter therein, and make cocoons. Remedies: Sprays seem of little account in fighting this pest. The best remedy I have seen suggested, is to apply about 1,000 pounds of kainit, per acre, to the infested orchard ground in June. This potash salt (it's a good fertilizer) is dissolved by rains, soaks into the ground, and kills the larvae.

Oyster-shell bark louse: Sometimes attacks pears as well as apples. For remedies, consult Chapter VIII.

Pear-leaf mite or "blister": A minute spider-like insect which infests leaves early in the season, causing blisters or galls thereon,—reddish in color at first, gradually turning to a dark brown later in the summer. Remedies: Spraying the leaves does little good. But, as the insects hibernate on the tree bark, I think that the lime-sulphur spray, applied before buds swell, would kill mites, scale lice, and fungus.

Pear-tree psylla: A tiny, jumping louse, yellowish in color, that attacks tender leaves and shoots, causing them to droop and exude sap or honey dew,—which condition soon attracts flies and ants to the feast. Entire orchards have sometimes been ruined, in a few years, by this pest. Remedies: Lime-sulphur, or kerosene emulsion, sprayed on the trees early in spring before buds swell; followed by tobacco solution sprays in May or June.

San Jose scale louse: See Chapter VIII.

Scurfy scale louse: See Chapter VIII.

Slug: The pear-tree slug is about half an inch, or less, in length when full grown; darkish color; slimy appearance. It eats the upper portion of leaves. This pest comes from eggs laid by a black fly. There are two broods of the slugs,—one in late June or early July, and another in August. Remedies: Almost any of the standard sprays will kill slugs; in fact, they are very easily destroyed. A simple remedy would be two ounces of fresh white hellebore steeped in one gallon of water and sprayed on leaves when slugs are there. Or arsenate of lead would do. Or, fine dry road-dust or air-slaked lime, thrown or blown into the trees, will kill every slug it covers.

PRINCIPAL FUNGOUS PESTS.—**Leaf-blight:** This very common and serious disease produces, on the leaves in the spring, reddish spots; these gradually enlarge and turn brown, until all or a large part of each affected leaf appears dark and dead. Badly injured leaves soon drop off, and in this way the trees may lose most or all of their foliage—which gives them a bad setback. The fungus also attacks

stems and fruit. It produces ugly, hard, scabby-looking places on the fruit, frequently causing it to crack open. Remedy : Spray the trees with Bordeaux before blossoms open ; repeat, after blossoms have fallen ; repeat, once or twice more, at intervals of two or three weeks. This trouble should not be confused with the disease called pear or "fire" blight, which attacks the limbs of trees.

Scab : Scabby fruit is usually caused by leaf blight. A very similar disease—apple scab—may attack pears.

"FIRE" OR PEAR BLIGHT.—This is a bacterial disease which injures or kills thousands of trees every year. It is to the pear orchard what the "yellows" is to the peach orchard—a deadly, relentless, not thoroughly mastered, enemy. Whatever it touches it blackens and "burns,"—leaves, blossoms, fruit and branches wither at its approach. It sometimes walks down a pear tree limb at the rate of from one to twelve inches a day ; usually only two or three inches, or less. One can easily recognize the disease. Watch the trees carefully during the growing season, and amputate attacked limbs at once. Have a bottle of alcohol, and dip the tool in it after each amputation ; it kills the blight germs that will cling to any implement and which may infect the next tree that is treated. Always cut *well below* the affected part of branch. Burn all cuttings, promptly. This disease is more apt to attack fast-growing than slow-growing trees, therefore an important part of the treatment is to avoid a too stimulating method of fertilization and cultivation.

COMBINATION SPRAYING SYSTEM.—The best system yet devised for most insect and fungous troubles,

is as follows: Spray trees just before blossoms open, with Bordeaux; after blossoms have fallen, Bordeaux-arsenical mixture; two or three weeks later, Bordeaux; if season is wet and leaf-blight prevalent, repeat Bordeaux two weeks later. (Special note: If scale lice are present, or pear-leaf mite, or psylla, begin spraying operations by applying lime-sulphur very early in the spring before buds swell. If desired, the later Bordeaux sprays may be replaced by the self-boiled lime-sulphur mixture.

VARIETIES.—Those marked with a star are especially suited for market.

M. J. Graham, an Iowa fruit-grower, has had best success with *Longworth; *Kieffer; *Warner.

For Virginia, H. L. Price recommends: Summer Doyenne; Rose; Clapp; *Bartlett; Lawrence; Sheldon.

For Illinois, just three commercial varieties are recommended by R. O. Graham: *Kieffer; *Garber; *Duchess.

For the southern states—Mississippi, Alabama, etc.—W. H. Ragan recommends: *Kieffer; Le Conte; Garber; Archangel.

For California, E. J. Wickson recommends: *Clapp; *Comice; *Anjou; *Clairgeau; *Bartlett; *Easter; *P. Barry; *Winter Nelis; etc.

Wilmer Atkinson suggests for Pennsylvania, etc.: Manning's Elizabeth; *Howell; *Bartlett; *Seckel; Dana's Hovey; Lawrence; Anjou; Duchess; *Kieffer; Winter Nelis.

B. G. Green, a successful Michigan grower, writes: If I were to plant another commercial pear orchard of 1,000 trees I should set: 650 Bartlett, 150 Clapp's Favorite, 100 Anjou, 50 Flemish Beauty and 50 Bosc.

For Ohio, New York, Indiana, Connecticut, etc.—Pomologist Ragan suggests: *Bosc; *Kieffer; *Anjou; *Bartlett; *Howell; Lawrence; Sheldon; *Boussock; Clapp; Brandywine; *Seckel; *Duchess; *Louise Bonne; Winter Nelis; and several other kinds.

For cold districts—Maine, northern Vermont, Wisconsin, Minnesota, etc.—Pomologist W. H. Ragan suggests the following: Vermont Beauty; Flemish Beauty; Wilder Early; *Bessemianka. (At the best, pear culture is precarious in very cold climates. Banking earth high up around tree trunks and holding it in place with boards, during the winter, is a great help.—J. B.)



RED JUNE

DAMSON

YELLOW EGG

CHAPTER XIV.

THE PLUM.

If it wasn't for the curculio, Jack Horner would find it easier to put his thumb into a pie and pull out a plum.—Tim.

Generally speaking, plum culture comprises several types or classes, viz.—European (*Prunus domestica*); Japanese (*Prunus triflora*); American (*Prunus Americana*; *Prunus hortulana*), comprising Wild Goose and similar native varieties; and *Prunus Chicasa* comprising the Chickasaw native types of our southern states. One or two other types are not of sufficient importance to mention here.

PROPAGATION.—Budding is the common method, on seedling plum stocks. These may be grown at home. Nurserymen, however, generally use Myrobalan, Marianna, or other imported plum stocks, because it is not easy to secure sufficient seed for extensive planting. Plums are sometimes budded on seedling peach stocks,—particularly in the south and for dry, sandy locations. *Americana* varieties usually do best if budded on their own seedlings.

SELECTING NURSERY TREES.—Two-year-old trees are about right. Fast-growing varieties are sometimes ready for planting when only one year old from the bud.

SOILS.—Plums do well almost anywhere,—if the ground is not *too* wet. This fruit, however, will stand much more moisture than the peach or cherry.

A clay-loam, rather moist but without stagnant sub-soil water, would be ideal for the European and native varieties. The Japanese kinds do very well on a lighter soil.

VARIETIES WHICH ARE OFTEN SELF-STERILE.—S. W. Fletcher says under this heading in Bulletin 181, Cornell Experiment Station: "Coe's Golden Drop, French Prune, Italian Prune, Kelsey, Mincer, Marianna, Ogon, Peach Plum, Satsuma, Wild Goose, and (according to Waugh and Kerr) all other varieties of native plums except Robinson."

PRUNING.—The plum requires more pruning than the cherry, and not so much as the peach. Upright-growing varieties require one style of pruning; sprawling kinds (like Burbank) require another. The trees may have a central leader, or be trained in the open-centre, vase-like style. Some varieties require more cutting-back than others. Study your trees. Plum fruits, like cherries, are mostly borne on fruit spurs which are at least two years old.

PRINCIPAL INSECT PESTS.—Aphis (lice): See Chapter X.

Borers: The plum-tree borer sometimes infests the base of main limbs and the upper part of trunk. The peach-tree borer, etc., occasionally attacks plum trees.

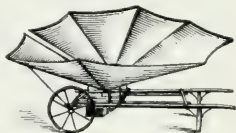
Remedies: See Chapter IX.



CURCULIO
(ENLARGED)

Curculio: A tiny, hump-backed, flying insect (see illustration) which stings the fruit shortly after blossoming time. It makes crescent-shape punctures and deposits eggs therein. These soon hatch into little grubs. Most of the stung fruit falls off the tree

before ripe. The curculio is sometimes called the "Little Turk," on account of the crescent-shape trade mark it leaves on fruit; in size, this insect is about three-sixteenths of an inch in length. Remedies: Bordeaux-arsenical mixture sprayed on trees just before blossoms open; repeat the same after blossoms fall; repeat, once or twice more, at intervals of a week. Destroy all fallen fruit. Also, a flock of chickens in a plum orchard is a great help. But the surest one remedy is the jarring process. Rig up a cloth-covered frame (like an inverted umbrella), mount it on wheels, and jar the curculios into it so they can be collected and killed (see picture). The jarring is best done (during the cool of early morning) by tapping the tree briskly with a padded, long-handled mallet. The insects, sluggish with cold or heavy with dew, drop into the frame below, instead of flying away. This jarring process should be repeated every morning or so, as long as the curculios are plentiful.



Plum gouger: A small snout-beetle without a hump on its back. Much like the curculio in its habits and the effect on the fruit. It punctures the fruit, but does not make a crescent-shape mark. Remedies are the same as advised for curculio.

Plum scale: Consult Chapter VIII.

San Jose scale louse: Consult Chapter VIII.

PRINCIPAL FUNGOUS PESTS. — Black knot: See Chapter XI. These dark, warty-looking knots or bunches on branches need prompt attention.

Brown rot: Consult Chapter XI.

Leaf-blight or spot: Often called "shot-hole" fungus. See Chapter XI.

Plum pockets: A fungous disease which causes the fruit to become distorted, enlarged and unhealthy; finally it turns dark in color, becomes wrinkled, and drops off the tree. No pits are found in these diseased fruits. Remedies: Early sprayings with Bordeaux; prune the trees and cut off as much as possible of the wood which bears diseased fruit.

COMBINATION SPRAYING SYSTEM.—For most insects (except borers, lice, etc.), and all fungous pests, I suggest that you turn to Chapter XII and use the complete system there advocated for peaches.

BARK-BURST, SUN-SCALD, GUM.—See Chapters IX, XI and XII.

VARIETIES.—Those marked with a star are especially suited for market.

R. O. Graham, an Illinois plum grower, has had best success with: *Wild Goose; *Miner; *Wolf; *De Soto.

E. L. Mason, Missouri, has had good success with: *Green Gage; *Lombard; *Niagara; *Shipper's Pride; *Damson; etc.

For Alabama, Mississippi, etc., W. H. Ragan recommends: *Chabot; *Cumberland; *Golden Beauty; Red June; Yellow Transparent; *Abundance; *Burbank; *Kelsey; etc.

For a commercial orchard in New York, George T. Powell recommends: *Reine Claude; *Giant Prune; *Peter's Yellow Gage; *Quackenboss; *Fellemborg; *German Prune.

For Pennsylvania, Ohio, Michigan, Connecticut, etc., Pomologist W. H. Ragan suggests: *Reine Claude (Bavay's Green Gage); *Bradshaw; *Coe's Golden Drop; *Damson; Black Diamond; *German Prune; *Grand Duke; Gueii; Imperial Gage; Yellow Egg; *Fellemborg (Italian Prune); *Lombard; *Quackenboss; etc.

DUCHESS



ANJOU

CHAPTER XV.

THE QUINCE AND DWARF PEAR.

They aren't big trees, but there's a lot of them to the acre.

Quince culture, except in a small way, is not very popular. A few commercial orchards are to be found, here and there, and the fruit brings fair prices whenever the supply is not overlarge. As the fruit is practically uneatable in a raw state, it is in demand only for canning, for marmalade, etc., and for flavoring preserves, etc. There is no more beautiful sight than a quince tree in blossom. Every family should have at least a few of the trees.

PROPAGATION.—Any one of several methods may be used: Budding, with quince seedlings for stock; grafting, on apple roots; layering; and making cuttings of ripened wood for planting (in nursery rows) like currant or grape cuttings. Cuttings should be taken in the fall, in about ten-inch lengths, tied in bundles, and stored away like scions until spring. Or they may be planted in the fall, and protected with mulch. I do not recommend layering.

CULTURAL HINTS.—Quinces do best on a moist (but well underdrained) clay-loam. However, they will grow fairly well on almost any soil which is not too wet. Thorough tillage is desirable. But remember that these trees are shallow rooted; do not plow too deep. Winter cover crops of some kind are essential; they help to keep the roots from frost

injury. Pruning should be systematic. Head back the new growth in the spring, or thin it out, or both,—as may be required to maintain a shapely, well-balanced tree. There is no sense in thinking that quinces must necessarily be straggling, misshapen bushes. Start with a straight stem two feet high, have the head open and well branched,—and you can make the tree as shapely as you please. The fruit is produced on little shoots which grow in spring on wood that is at least two years old. Keep all suckers cut off from around the trunk.

PRINCIPAL INSECT AND FUNGOUS PESTS.—The codling moth, the quince curculio, the round-headed apple-tree borer, the pear-tree slug and the pear-tree blister mite, all bother quince trees more or less. Remedies have been given in preceding chapters. There, too, you will find hints about leaf blight, rust, rot, twig blight and fire blight,—all of which are well-known enemies of the quince. The quince should be frequently sprayed with the Bordeaux-arsenical mixture, or with the self-boiled lime-sulphur.

VARIETIES.—Comparatively few kinds are grown. Probably the best, for almost any locality, would be : Orange ; Rea ; Meech ; Champion.

DWARF PEAR.

If properly grown and cared for, these trees are thrifty, productive, long-lived and profitable. But if neglected, they are equally short-lived and worthless. I know of several dwarf-pear orchards that are now twenty to forty years old, which began bearing fruit when about four years old, and which are still healthy

and productive. They have rarely if ever missed a crop.

PROPAGATION.—By budding the pear on quince seedlings, dwarf-growing pear trees result. But the fruit is not dwarfed; on the contrary, it is unusually large and fine, and the trees come into bearing much sooner than standard pears.

CULTURAL HINTS.—The best soil is a moist clay or clay-loam soil, thoroughly underdrained. Cultivation, fertilization, spraying, pruning, etc., must be



A MICHIGAN DWARF-PEAR ORCHARD

systematic and thorough. Unlike the standard pear, the dwarf never does even "fairly well" in soil. When setting the trees, be sure to set them very deep,—so that the bud joint will be, say, six inches

below the surface. If thus set the trees are less likely to break off at the joint (which is always a weak spot in dwarf pears); and, too, deep setting will encourage the pear wood to send out some roots of its own, which adds to the vigor and stability of the trees.

PRUNING.—Dwarf pears need a great deal of trimming,—principally “cutting back.” And they need it regularly each year. About two-thirds or three-quarters of the new growth should be cut off annually,—making the cut each time to buds which point outward, so as to broaden the trees. Tall, spindling trees have little “bearing surface,” and, besides, such trees are more apt to blow down during heavy wind storms. (Windbreaks are a specially good thing for all dwarf pears.)

INSECT AND FUNGOUS ENEMIES.—The same pests that trouble the standard pear, also bother the dwarf. Consult Chapter XIII.

VARIETIES.—Only a few varieties of pears do especially well as dwarfs.

L. T. Yeomans, whose dwarf-pear orchard is about fifty years old, expresses a decided preference for the Duchess variety.

L. H. Bailey, New York, says that the most successful kinds are Duchess, Anjou, Louise Bonne, Manning's Elizabeth and Clairgeau.

C. S. Mills, a Michigan grower who has been remarkably successful with a commercial dwarf-pear orchard, writes that if he were going to set another dwarf orchard today, he would plant six-tenths *Duchess trees, three-tenths *Anjou, and one-tenth *Louise Bonne. (I do not think this list can be much improved for any section of the country.—J. B.)





PARAGON CHESTNUTS

CHAPTER XVI.

NUT TREES.

It seems to me that a good nut orchard is worth working for.—Tim.

The almond of commerce is the “soft shell” or “paper shell” type, but the variety is too tender for satisfactory orchard growing in cold sections of our country. In California, etc., the business is a moderate success. Occasional trees have been made to do fairly well in northern and eastern states where the peach succeeds, but, without protection, such attempts are uncertain. In the South, the trees are apt to bloom very early and be nipped by spring frosts.

BEECH NUT.—This well-known forest nut is hardly adapted to orchard planting.

BUTTERNUT AND BLACK WALNUT.—These, though very useful trees in their way, are scarcely in the orchard class at the present time. Trees are usually propagated by raising seedlings from choice nuts. I believe that more of these trees should be planted.

CHESTNUT.—Now we come to a species of nut which has distinct commercial possibilities for the average American. Mr. Joseph L. Lovett, of Pennsylvania, now has about fifty acres on his own farm planted to improved chestnuts,—mostly Paragons.

Mr. Lovett plows his orchard each spring and then gives the soil regular cultivation until September first. No autumn or winter cover crop is planted, because such a growth would interfere with the

finding of the nuts when they fall on the ground. The trees are set about thirty feet apart each way; they begin to bear when quite young, and are not pruned or sprayed—unless it is to trim up an occasional branch that droops too near the ground. The red spider leaves its mark on the foliage every season, but Mr. Lovett says that he “pays no attention” to this insect pest.



CLUSTER OF PARAGON CHESTNUT BURS

The weevil has found its way into the Lovett groves. *But not in force.* There are no overlooked nuts, no stumps, no underbrush, in which they can breed; the soil is frequently cultivated, all the nuts are picked up each season, and, consequently, the weevil has not proved to be a serious pest on this farm.

When harvesting the nuts, they are never picked, knocked or shaken off. Mr. Lovett waits until Jack Frost loosens the crop.

"*Plow a chestnut orchard deeply,*" says Mr. Lovett. "You should endeavor, in every way possible, to encourage a large, deep-growing root system. This is very important."

Some nut-growers are taking chestnut stump land, and are whip-grafting Paragons, etc., on the sprouts which come from stumps. Mr. Lovett says that this method has objections. He prefers nursery trees.

Recently, a serious new contagious bacterial disease affecting all kinds of chestnut trees has appeared in the East. The leaves turn yellow and the tree dies branch by branch. Remedy, the same as for pear fire-blight.

CHINQUAPIN.—A wild, dwarf, bush-like variety of chestnut, of little commercial value.

COCOANUT.—There are a few successful groves in southern Florida.

FILBERT AND HAZELNUT.—We call the American product "hazelnuts," and the imported kind "filberts." Botanically they are both *Corylus*. Commercially the culture of hazelnuts has not been much of a success in this country in the East, and but slightly more so in California.

HICKORY NUT.—The shellbark hickory is as yet mainly known as a forest tree, but the time is no doubt coming when some of the finer varieties—Hale's Paper Shell, for instance—will be commercially planted. Hickories (like black walnuts and butternuts) object to transplanting, and it is not easy to propagate them by grafting or budding; therefore they are usually grown from selected seed.

PECAN.—This highly-esteemed nut tree is a species of hickory indigenous on fertile, moist lowlands in

Ohio, Indiana, Iowa, etc., and in many of the southern states. Commercially, the culture of this nut is not likely to extend much north of the Ohio and the Potomac rivers, says Prof. Bailey. Trees farther north are not apt to be very productive, and the nuts are smaller in size. Seedling trees seldom grow true to type; therefore grafted or budded trees are most desirable. A splice crown-graft, on a pecan seedling stock, is one of the best recommended propagation methods. But all methods are difficult; better buy trees of a nurseryman. Very little pruning is required after the tree is well started. Cultivation is very helpful to a nut orchard. Paying crops should not be expected before ten or twelve years. Every locality has its favorite varieties, some of the best known being: Century; Van Deman; Stuart; San Saba.

WALNUT.—Our excellent native variety, the black walnut, has previously been mentioned in this chapter, in connection with the butternut. The English walnut (also called "Persian" walnut and "Madeira" nut) is not suited to cold climates, and commercially it is profitable, in this country, in practically but one state—California. Specimen trees can be grown, however, in Pennsylvania and similar climates. Another imported species—the Japan walnut—is often grown as an ornamental tree in the East and North. It is hardy, bears its nuts in odd-looking clusters, but has little commercial value.





CHAPTER XVII.

CITRUS AND OTHER FRUITS.

There's a special fruit for everybody's taste ; take your choice.

APRICOT.—This delicious fruit is like both peach and plum. It can be grown, under right conditions, as far north as western New York, being about as hardy as the peach and requiring the same special conditions. Borers, rot and the curculio are the principal enemies.

AVOCADO OR ALLIGATOR PEAR.—Occasionally grown in southern Florida.

CITRON.—This is a small, bush-like tree which bears a large, thick-rinded fruit which somewhat resembles a lemon in appearance. Grown to a moderate extent in Florida and California, for preserves.

CRAB APPLE.—The best-known varieties are : Hyslop ; Martha ; Red Siberian ; Transcendent ; Whitney ; Yellow Siberian ; etc. For insects, fungous troubles, culture, etc., see chapter on The Apple.

DATE PALM.—Occasional plantings of this noble tree are to be found in Florida, Mexico, Arizona, California, etc. The dry, even climate of Arizona will probably produce this fruit better than any other place in the United States.

FIG.—Except on the Pacific coast or in the far South, fig trees are not commercially successful in this country. But by bending the trees down to the ground in the fall and covering them, or by growing

them in tubs which can be put in a cellar during the winter, it is quite possible to raise figs for home use almost anywhere.

GUAVA.—An attractive, refreshing fruit of the tropics. Successfully grown in southern Florida.

LEMON.—Grown commercially in California, southern Florida, etc. Propagation is usually by means of budding on seedling stocks (orange seedlings are often used). The trees are generally set twenty to twenty-five feet apart. Cultivation should be given. Cut back and thin out the shoots each season. The lemon is more tender, as regards frost, than the orange. Some of the leading varieties are: Belair; Genoa; Imperial; Sicily; Villa Franca; Lisbon; Eureka; Messina. The fruit is picked before it colors, and placed in shallow curing-trays until ready for packing. Each fruit is cut, instead of being pulled, from the tree.

LIME.—A valuable member of the citrus family, although not much cultivated in this country. The fruit is used in making cooling drinks, and in the manufacture of citric acid.

LOQUAT.—This fruit is sometimes incorrectly called "Japan plum" or "Medlar." It is a small, ever-green tree. Hardy as far north as Charleston, but will not fruit satisfactorily much outside of the orange belt.

MANGO.—This tropical fruit is too tender except for southern Florida, etc.

MULBERRY.—Not grown commercially, but everybody should have one or two trees. Downing is probably the best variety, but it is not entirely hardy

much north of Philadelphia. New American is the most promising variety for northern localities. Russian is most hardy, but the fruit is not so good as Downing, etc. Mulberries may be propagated by cuttings of the ripe wood.

NECTARINE.—This fruit is practically nothing but a smooth-skin peach; it is not so popular as the peach and is not much grown except in California.

OLIVE.—A commercial success only in California.

ORANGE.—In California the orange industry has reached enormous proportions; and in Florida the business is rapidly recovering from the disastrous freezes of a few years ago,—the centre of the orchard region having been moved farther south. Seedling groves are not uncommon, but the most satisfactory method of propagation is budding upon sour or sweet orange seedling stocks. "Trees should not be set deeper in the ground than they were in the nursery," says a prominent grower. Cut back the head severely and trim the roots. After the tree is well started but little pruning is required,—except to cut out dead or crossed limbs, and watersprouts, etc. A loose, mellow, well-drained soil, free from hard-pan near the surface, is desirable. The trees need plenty of potash and phosphoric acid, and not too much nitrogen.

Principal insect and fungous troubles: The rust-mite, red spider, mealy bug, leaf roller, caterpillars, aphids, and the "purple," "long," "red," "circular," "white," "ribbed," "broad," "black" and San Jose scales, are all enemies of the orange grove, and are fought with the usual remedies—whale-oil soap, kerosene emulsion, arsenate of lead, lime-sulphur-salt, etc.

"Foot-rot," "die-back," limb-blight, scab, etc., all require special treatment, if present.

Varieties: Some of the most popular varieties in Florida are: Indian River; Centennial; Tardiff; Homosassa; Jaffa; Majorca; Parson Brown; Satsuma; Dancy; King (the last three are Tangerine or "kid-glove" varieties). In California the Washington Navel orange is, of course, the most popular; Paper-rind (St. Michael); Jaffa; Mediterranean Sweet; Malta Blood; etc.; and some of the Tangerines, are also planted. Oranges should be mature when gathered.

In the Gulf-coast counties of Texas, Mississippi, Louisiana and Alabama, Satsuma oranges budded on *Citrus trifoliata* stock have recently been grown commercially. These trees are more hardy than other kinds of oranges, but whether or not they will stand a severe freeze remains to be seen.

PAWPAW.—This tree is a native of our central-states valleys, and is found along the banks of rivers. Commercially it is of little importance.

PERSIMMON.—The American persimmon, or, as it is sometimes called, "date plum," grows wild in many parts of the United States. Few attempts have been made, as yet, to improve it or to grow it on a commercial scale. It is a difficult tree to transplant.

A foreign variety called Japanese persimmon, or Kaki, bearing larger and finer fruits, is grown in the far South for market. This is not hardy in the North.

POMELO.—Also called "grape fruit" and "shaddock." A variety of citrus tree which is planted, cultivated, and cared for about the same as the orange.

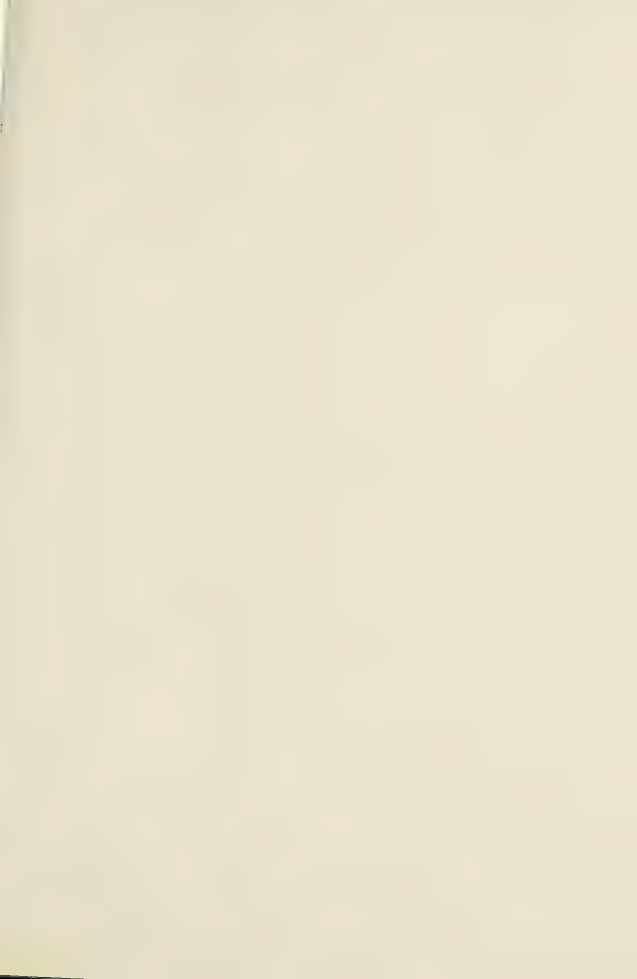


PLATE XVIII

SMOCK FREE - TWO SPECIMENS. NOT LARGE, BECAUSE NOT THINNED



GLOBE

CHAPTER XVIII.

PICKING FRUIT.

Two good fruit rules : Never pick fruits when they are wet, and handle them like eggs.—Tim.

“How am I to know the right season to pick my apples or pears?” is a question often asked. The simplest method of determining the matter is to take hold of a pear or an apple on the tree and gently bend it upward. If ripe enough to pick, the stem will part from the branch without breaking. But, in addition to this method, the experienced grower is guided largely by the “time of ripening” of each variety. Each kind of fruit has its own season for reaching maturity ; catalogs, fruit lists and observation easily make that season known to any one who desires the information. The appearance of the fruit, and whether or not its seeds look black and mature, are further guides. It is important to do the picking only during cool, clear weather.

All orchardists should pick (not pull or shake) their fruit from the trees if they would get the best prices. But, many trees are being slowly ruined by careless picking—the kind that pulls off the little spur that has developed the fruit, which if left will develop fruits in after years. There is a slaughter of these spurs in most orchards. Grasp the apple or



HANDY
LADDER

pear firmly, as indicated in the cut, and give an upward bend of the wrist; then the fruit comes off with only the stem attached. No time will be lost, either, in thus doing the picking right, and the stems will be left on the fruit—as they should be.

Apples should be ripe, but hard, when picked. In the latitude of Philadelphia the main-crop winter varieties are usually gathered in early October.

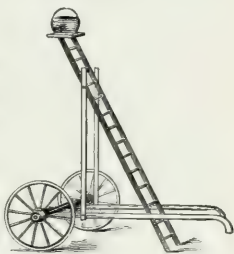


THE FRUIT HARVEST

Pears, on the contrary, are still green when ready to pick. They are mature but not ripened,—the coloring process should come *after* they have been taken from the tree; this insures better eating, keeping and shipping qualities.

CHERRIES.—The principal points of importance are, care in picking the fruits with the stems on, and

in not pulling the spur off to which the stem is attached, says T. A. Farrand, in a special report to the American Pomological Society. Throw all inferior, bruised or decayed fruits on the ground rather than in the basket, and thus avoid a mussy lot of fruit for the packers to cull over. Have good ladders and pick all the fruit you can from thence, rather than climb around in the tree and break the limbs and fruit spurs.



FOR HIGH TREES

Two pickings, with an interval between, are usually all that are necessary to clean up the tree. One of the most successful Michigan growers, Mr. Benton Gebhart, harvests all his cherries, both sweet and sour, by spreading sheets under the trees; the pickers then clip the fruit off with scissors, leaving about a half-inch stem with the fruit, allowing it to drop on the sheets. Mr. Gebhart is far better satisfied with this method than with the usual way, as there are no fruit spurs pulled off as in picking. The pickers are well satisfied to do the work in this way. The fruit is sorted from the sheets into the market packages, and Mr. Gebhart claims that he gets on an average seventy-five cents more for a sixteen-quart crate of cherries with clipped stems than for unclipped. It takes from two, to two and a half, quarts more of clipped stem fruit to fill a sixteen-quart crate, than where the whole stem is left on. Cherries (particularly the sweet varieties, which are very subject to rot)

are quickly perishable and must be picked the instant they are ready. Delay means loss by birds and rot.

PEACHES.—To determine "just when a peach is ready," requires a little observation and experience. For shipping purposes the fruit should be ripe, but hard, — the degree of hardness depending upon the distance the fruit must travel. Many expert peach growers "go over" each tree at least twice; and, often, three or four times, at intervals. Why?



PICKING BENCH

Because peaches seldom ripen evenly on a tree, and, by the time all were ready to pick, some would be too soft for shipment. Peaches, like cherries and plums, are quickly perishable and therefore must be handled promptly and at just the right minute. Each variety has its own ripening time, and by dividing an orchard into, say, six kinds which ripen at intervals of about a week apart, the orchardist is enabled easily to handle one variety before the next is ripe. This is a great point in large orchards where competent help is hard to get, — spreads the picking and packing over six weeks, instead of crowding it into only one or two.



FOR LOW
TREES

PLUMS.—If possible, pick plums, for market, "with the stems on." The fruit should be ripe, well colored, but not soft. If rot threatens (as it often does), the sooner you can pick the crop, the better. Don't delay a moment. Watch for the right time, and then hurry matters.

QUINCES.—A quince should be ripe and well colored before it is picked. Green specimens are not very attractive to the average buyer. If necessary, pick the trees several times, at intervals, so as to secure all the fruits in a proper condition.

FRUIT SPURS.

Better bruise your shins than your fruit.

If possible, pick fruit during the cool of the day; and avoid picking during extra hot, murky days.

For home use, let peaches and plums thoroughly mellow and ripen on the trees. But this won't do for fruit which is to be shipped.



FIG. I

Fruit should be set in the shade or taken to the packing house as soon as picked. Don't let it sun-cook. Get it cool and keep it cool.

Figs. I and II show two styles of long-handled fruit pickers which are sometimes used for high-up fruit. Fig. II has a canvas chute arrangement for letting the fruit down into the picker's hand.



FIG. II

With either apples or pears, one picking is usually sufficient to secure all the fruit in proper condition. Sometimes, however, it pays to pick the larger, more mature specimens first, and then clean up the tree a few days later.

Look to the safety of the fruit ladders. A rotten spot may mean a broken leg or arm. Frequent coats of paint will preserve the soundness of the wood. In this chapter will be found several pictures of different styles of picking ladders.

Do not handle fruit more than is necessary. The natural bloom should be left on. And endeavor to pick apples, pears, etc., before winds blow many of them off. Pick the outside trees first, as the inside trees in an orchard are more protected from the wind's force.

Do not squeeze peaches on a tree, to see whether or not they are sufficiently soft to pick. Decay swiftly follows such treatment. Expert pickers soon learn the knack of "feeling" of a

peach without really squeezing it. The eye, and this delicate sense of touch, become trained to work together.



A basket hung from the rounds of a ladder is inconvenient to reach. Fit an iron in the shape shown in the cut, and you can then have your basket at the side of the ladder, in the handiest of all positions. A few wooden pegs up and down the ladder will keep the iron from slipping. A blacksmith can make it in a few minutes. And here's the picture of a double-basket holder for hanging on to a tree limb.

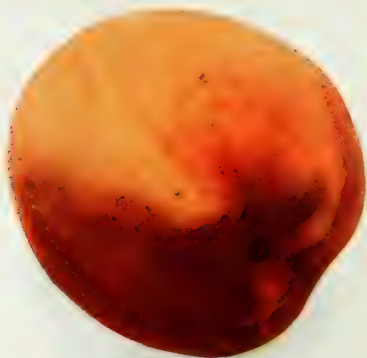


Wilmer Atkinson says: "We pick all sound apples from the trees into tin pails, gently pour into slatted bushel-crates, and take them to our cool 'apple mow' (once a hay mow). This storage place has been double walled and lined, and keeps our winter apples until May. We do the sorting in the winter." (See Chapter XX for further particulars about this simple method of cold-air storage.—J. B.)

A well-known Pennsylvania apple grower has issued to his men the following printed rules for picking: 1. Pick lower limbs first. 2. See that the ladder is pushed into the tree gently so as not to knock off or bruise the fruit. 3. Hang the kettle or basket so as to be able to pick with both hands. 4. Lay the apples in; do not drop or throw them. 5. Pick no specked apples. 6. Pick no small, green ones. 7. Do not take much time in picking a few little apples out of reach,—let them go. 8. In emptying, pour gently, as you would eggs. 9. Do not set one basket or crate on another so that the apples below will be bruised. 10. Lift and set down gently all filled crates. 11. Use spring wagon in hauling, avoid rough ground, and go slow except on smooth road. These rules are necessary for the proper harvesting of the crop.

*"When swallows on the barn roof's perch, to chatter of their flight,
When hints of frost are in the air, and crickets chirp at night;
Then come the pleasant days we love in Autumn's mellow prime,
The jolliest days of all the year—the apple-picking time.
For the laden boughs are bending low o'er all the orchard ways,
The apples' cheeks are burning red, and father smiles, and says
Some sparkling morn: 'I think today we might as well begin;—
Be smart now, boys! you'll need a week to get those apples in.'"*





CHAPTER XIX.

GRADING AND PACKING.

Instead of a coreless apple, we need one that is as big in the middle of the barrel as at the ends.

The package that has been most commonly used up to the present time, for apples, is the barrel. The standard of size is not uniform throughout the apple region.

The New York law calls for a barrel with "head diameter seventeen and one-eighth inches; length of stave twenty-eight and one-half inches; bulge not less than sixty-four inches, outside measurements."

The Missouri barrel is as follows: "Length of barrel twenty-eight and one-half inches, with chines of three-fourths of an inch at the ends; the diameter of the heads shall be seventeen and one-fourth inches and the diameter of the centre of the barrel inside shall be twenty and one-half inches."



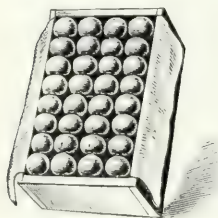
The Canadian barrel for export apples is required by law to be "twenty-six inches and one-fourth between the heads, inside measurements, and a head diameter of seventeen inches, and a middle diameter of eighteen inches and one-half, representing as nearly as possible ninety-six quarts."

The barrel recognized by the National Apple-Shippers' Association is seventeen and one-eighth inches in diameter of head, twenty-eight inches in

length of stave, and bulge not less than sixty-four inches, outside measurement.

The barrel should be well made, clean, neat and attractive. The statement is sometimes made that the "package sells the fruit." While this may not be strictly true, still the package, making as it does the first impression, favorable to the product or unfavorable, has much to do with disposing of its contents. Under no conditions should the barrel be undersized; it should give full measure as determined by law or the custom in the region from which the fruit comes.

BOXES FOR APPLES.—During recent years the bushel apple box has been brought into prominent notice. Probably the box has come to stay and will continue to grow in popular favor. The strong point in favor of the box is that it suits the needs of the small housekeeper. Many hesitate to buy a barrel



BOXED APPLES

of apples who would be glad to get the same material in a smaller package. But the box should not be used for anything but first-class fruit. The size of the box is not yet uniform. The one recommended for national legislation is a box containing 2342 cu. in., or about the capacity of the present

Colorado box. The legal box in Canada, and the "special" of the far West, is 10 x 11 x 20, while the "standard" box of the latter section is $10\frac{1}{2} \times 11\frac{1}{2} \times 18$ —all inside measurements.

PACKING 'HOUSE.—A portion of the barn may be arranged for packing fruit, or a special shed or packing house may be erected. Some growers do their packing on tables placed in the shade in the orchard. Padded tables with sloping tops and rim sides, are very helpful aids to the sorting or grading operation. Endeavor to have the packing house or place as cool as possible.

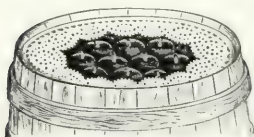
GRADING APPLES.—Three grades are sufficient, or rather, two grades and the cull-heap. I believe it best to follow the standard of size as determined by the National Apple-Shippers' Association, says Mr. H. H. Hume, and their remarks on quality are quite in place: The standard of size for No. 1 apples of large varieties, such as York Imperial, Stayman, Rome Beauty and Ben Davis, is set at not less than two and one-half inches in diameter. The standard of size for No. 1 apples of the smaller varieties, such as Winesap, Jonathan and Bonum, is not less than two and one-fourth inches. All No. 1 apples should be practically free from worm-holes, bruises, breaks in the skin, and be of good color, well-grown and hand-picked.

No. 2 apples are those which are not less than two and one-fourth inches in diameter. The fruit must be free from bruises and breaks in the skin. The size of No. 2 apples of the smaller sort has not been fixed, but two-inch diameter apples might be included.

The stems should be in all first-class apples, or in at least eighty-five or ninety per cent. of them, and the specimens in a lot of this kind should be uniform in size, color and appearance. The fruit may be graded as it is packed. Two barrels should be set

up—one for No. 1's, the other for No. 2's—and as the fruit is picked over, each class finds its way into its respective barrel. Whether this work should be done soon after picking, or later during the winter, depends largely upon the grower's own methods. Wilmer Atkinson prefers the latter way (see preceding chapter). One thing is certain: *It pays to grade fruit.* Most of this grading is done by "hand and eye"; machine graders are sometimes used.

PACKING APPLES.—Two layers of fruit should be placed in the bottom of barrel, with stems down and as close together as possible. These will form the



FANCY APPLE-PACKING

facing, for this end will be the top when opened. Fill in with the same grade, often shake, and when near the top put in two more layers with stems up, letting the last layer stand a full inch above the chine of barrel. Now put on lid and slowly press into place, shaking the barrel in the meanwhile.

Some packers place a round, corrugated paper cushion beneath and on top of the fruit in each barrel; some use no cushion of any kind; others use ordinary paper; a few decorate the top with an edging of white lace-paper, in addition to the corrugated cushion. For filling the barrels, a small basket, one that will go down into the barrel, and provided with a swing handle, will be found very convenient. This basket is filled with fruit, let down into the barrel and turned over, allowing the fruit to run out.

A barrel header, such as the stores sell, is a handy implement to own. But if there are only a few apples to be barreled, it may not pay to buy a press. One can be rigged very quickly by using a plank or scantling with one end under a stud reaching to the shed plate and temporarily nailed in place. The barrel to be headed is placed as shown. Be careful not to press the apples too hard.



HOME-MADE BARREL PRESS

Apples in boxes: Each apple should be put in place by hand—in rows and tiers (like oranges), every apple perfect. The number and arrangement of rows depends upon what size apple is being packed; each size will require a different method of “placing to fit.” Sometimes the rows will need to be diagonal or irregular; a little experimenting, practise and “knack” will soon determine the best way to make a size fit a box and “come out right” on top. Every apple in a box should be uniform in size. Some packers line the boxes with white paper; and some wrap each apple in paper made for the purpose.

Stenciling apple packages: As soon as the package is closed up and securely nailed, it should be properly marked. The box should be marked on both ends, while the barrel should be marked on the faced end intended for the top. Both should bear the name of the variety; the grade of apple, whether No. 1 or No. 2; the name of the grower and the place where grown.

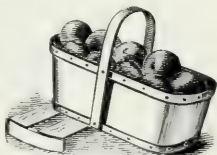
Handle fruit like eggs—with care. Don't mix different varieties, shapes and colors in one package. Don't mix windfalls with hand-picked fruit.

CHERRIES.—Baskets not larger than eight or ten pounds should be used in picking. The packing house should have tables or frames with canvas bottoms, on which carefully to lay the cherries for sorting into packages. The fruit in the package should be uniform throughout and tastefully faced to attract the attention of the fastidious, who will pay the highest market price. In California, sweet cherries are usually packed in shallow, small, wooden boxes holding about ten pounds, and the fruit is carefully sorted and faced in regular rows—stem end down and out of sight. The effect is very pretty, but such packing requires labor and time; it undoubtedly pays, however. In the East, sweet cherries are commonly packed in ordinary quart berry boxes, sixteen (or more) boxes to the crate. If the top of each box is properly faced, the effect is good; but not so good as the California package.

Sour cherries are usually packed either in eight-pound grape baskets, or in the quart boxes mentioned in the preceding paragraph. The top layer of fruit should be placed, stems down, in regular rows. Girls or women can do this work nicely. The extra expense of thus facing a basket of cherries amounts to about four cents. Does it pay? As a rule, yes. A Michigan friend of mine does even more: He packs his cherries in quart boxes in sixteen-quart crates, and along the top edges of crate, folded down over the fruit, he places a narrow edging of white lace-paper,

—something similar to the edging often seen on candy boxes. The edging he uses is about two inches wide and costs "less than a cent a crate." Then, with a small cluster of fresh cherry leaves placed in the centre of fruit at each crate end, he considers that the job is complete. His fruit certainly does look remarkably nice, and the prices received for it are extra good. His name and guarantee go on every crate.

PEACHES.—Different peach-growing districts have different styles of packages. In Michigan, for instance, the favorite package for peaches is the sixth-bushel Climax basket with extension slat cover; in New Jersey, high, round, flaring-top baskets are in favor, holding about half a bushel; in Georgia, the six-basket crate



CLIMAX PEACH-BASKET



SIX-BASKET PEACH CRATE

is the thing, each basket holding about four quarts. Then there are four-basket crates, open-sided peck Climax baskets (for fancy fruit), fifth-bushel Climax baskets, round bushel baskets with slat covers, etc., etc.

"What package to use" is largely a matter of locality and choice.

Peaches are usually graded into three or four sizes, and each size is packed by itself and labeled accordingly. Machine graders do excellent work, and are often used by large growers. In the Michigan and

Georgia baskets, the peaches are fitted into regular rows and tiers, all arranged "just so." The largest or first-grade peaches are often labeled "Fancy" or "Selects." Red tarletan is sometimes fitted over each



A MACHINE PEACH-GRADER

basket, giving the fruit a pink, pretty, but rather deceptive look.

PEARS. — This fruit is usually packed and shipped while still in a green state. Bushel boxes, barrels, round bushel or half-bushel baskets, kegs, etc., are favored by different growers and localities. The ripening is nearly always done by the dealer. Grading must be done by hand and eye; I have not yet heard of a successful machine grader for pears. Fancy fruits should each be wrapped in paper,—California style.

PLUMS. — All sorts of packages are used for this fruit; it does not seem to have an individual package especially adapted to its needs. Peach baskets, grape baskets, strawberry boxes in crates, etc., etc., are all used. Each grower has his own preference; and, of course, the style of package chosen should depend largely upon the distance it must be shipped.

QUINCES. — Barrels, half-barrels, bushel baskets, etc., are all suitable for quinces. Each fruit should be well colored, unbruised and perfect. Make two grades or sizes. Use the culls at home.



GERMAN PRUNE

GREEN GAGE

KEISEY

CHAPTER XX.

COLD STORAGE AND MARKETING.

After producing fine fruit, learn how to sell it; the proof of the selling is in the size of the cheque.—Farmer Vincent.

It is not advisable, in my opinion, for the average fruit-grower to use ice for cold storage purposes for winter apples, etc.,—at least in the latitude of Philadelphia and northward. In Chapter XVIII I referred to Wilmer Atkinson's cold storage method, and I want to say more about it, now. Here is a copy of a letter from him in which he gives particulars about the method:



“On Monday we begin to pick our crop of Mayfield apples and expect to have between 4,000 and 5,000 bushels. The orchard has just come into bearing, this being really the first crop. Having a very large barn, much of the space contained therein is available for storing other things than hay, wheat, etc.; so I have converted a mow, 25 x 40 feet, into two storage rooms, one above the other. It is a stone barn with thick walls, sufficient, with a little lining inside of thick paper (on two sides), to keep out frost. I have also doubled the wooden walls on the other two sides, with felt between, and now have what I deem to be an admirable place to keep winter apples,—up to the first

of April. The two rooms will hold, I think, my entire crop. Three double doors are made in each room for the ingress of air on cold nights, my purpose being to use cold night air instead of ice for keeping down the temperature. Whenever the temperature outside is colder than it is inside, the doors will be opened and the air let in; the doors will be all closed when it is warmer outside. We expect, before October is out, to get the temperature down below fifty degrees and keep it there through November; and by December we can easily get it down to thirty-five. Were I going to build a cold storage house for winter apples I should do it upon this principle and not bother with ice at all. But the walls must be tight, double, paper lined, and with an air space between. Heat must be kept *out*, cold must be kept *in*. Open the doors and let in cool night air; close them during warm days. During the winter if the thermometer sinks to zero or lower, and stays down for three or four days, as it sometimes does, it may be necessary to leave a lighted lantern or small oil stove in the storage room during the cold snap, so that the fruit will not be frozen. Apples thus stored keep all their good flavor,—which is more than I can say for fruit stored in ice or ammonia-cooled buildings.”

I happen to know that Mr. Atkinson has subsequently proved the truth and success of his plan, and I can heartily recommend the idea to other fruit-growers. This method will keep good winter apples as late as April 1st. What more is necessary? I can see no advantage in later keeping of apples. After April, apples come into competition with strawberries, etc., and are not usually very much wanted; besides,

the average grower hasn't time, after April, to attend to the proper marketing of apples—he is too busy with the spring work. And, too, many growers can not afford to pay the charges demanded by some of the big refrigerating plants.

Pears will not keep nearly so long as apples, and are usually all marketed, green, early in the season.

SELLING FRUIT.—J. H. Hale says: "Get a good dealer and tell him you have a good thing. Have your commission man go and see your place. The business side of fruit-growing means belief in yourself and then making those with whom you trade believe in you."

H. H. Hume says:—"The best plan is to get in touch with fruit dealers or commission men in good markets and get them to handle the fruit. Either ship to them on consignment or sell to them outright. Pick good, reliable men; send them good material, treat them squarely, and you will receive like treatment in return."



Another good way to sell fruit is to secure a number of personal, retail customers to whom you can sell direct. Or make arrangements with stores.

In some localities and with some kinds of fruit, it is possible to sell the crop, on the trees, for a lump sum per acre or for the entire orchard. The buyer does the rest.

Oftentimes buyers will buy an entire orchard's product, and agree to pay so much per barrel for firsts and so much for seconds; or they may offer so much per barrel "as the fruit runs." Sometimes the arrangement is that the grower is to do all the picking,

grading and packing, and deliver the fruit at the nearest railway station or steamship wharf.

Wilmer Atkinson's method is to store the fruit until winter or later, and then gradually sort, pack and market it during the leisure months.

"Central Packing Houses," "Fruit-Growers' Exchanges," "Co-operative Marketing Associations," etc., have been more or less successfully operated in California, Michigan, Wisconsin, Cobden, Ill., Springfield, Mo., Maryland, Georgia, etc. These concerns are usually incorporated, and the surrounding fruit-growers own stock and control the management. Such mutual associations, when rightly officered and conducted, are often a great blessing to a fruit-growing community. Instead of, say, one hundred different brands in one locality—all different and all competing against each other in open market—there is (where a central packing and selling concern exists) just one brand. And this one brand, being all graded and packed uniformly and in very large lots, can be sold to better advantage than a diversified product.

Well, Harriet hints that it is time for me to stop,—that this book is already too long. So, while she looks over my shoulder and nods her head encouragingly, I believe that I had better say: "Good-night."



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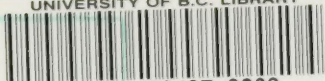
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